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THE DIAGNOSIS AND TREATMENT OF LUDWIG'S ANGINA*

A Report of Twenty Cases

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BOSTON

IN a recent communication, one of us (A.C.W.[1]) presented a study of 31 cases of Ludwig's angina. In that study, an effort was made to ascertain the pitfalls most frequently encountered in the treatment of such patients and, with these hazards in mind, to set forth a plan of management calculated to give the highest degree of success. In a second paper[2] appearing somewhat later, suggestions were made pertaining to the choice of anesthetic in Ludwig's angina, it being clearly recognized that anesthesia constitutes a major problem, the successful solution of which is essential to an adequate surgical procedure. The present report consists of an analysis of 20 consecutive cases of Ludwig's angina, representing all the patients with this disease seen at the Boston City Hospital during the three years from June, 1939, to June, 1942. These cases comprise all those seen at the Boston City Hospital since the submission of the original report. Twelve of the patients were seen by us personally, and 8 were under the treatment of our colleagues, with whom we were closely associated. Thus considerable opportunity has been afforded us to test the validity of our previous conclusions and to expand our knowledge of this disease.

The mortality in the present series was 10 per cent, compared with 54 per cent in the earlier one. Such a clear-cut improvement offers tangible substantiation of the principles of treatment previously advocated, and warrants the reporting of our more recent experiences. Accordingly, this paper will be largely confined to the presentation of these experiences and the opinions derived therefrom.

DIAGNOSTIC CRITERIA

Inflammatory diseases in the submandibular region and about the floor of the mouth are commonly subject to diagnostic error. Ludwig's angina is no exception. The disease is either not recognized or is wrongly diagnosed as submental abscess, cervical adenitis, cellulitis of the submaxillary gland or some similar condition. The essential criteria are anatomical as well as clinical.

Anatomically, there must be inflammatory involvement of both the sublingual and submaxillary spaces. The former is recognized by edema, induration, tenderness and elevation of the floor of the mouth, the mucosa of which is usually flecked with a dirty grayish-white exudate. Also, the tongue usually shows varying degrees of edema, so extensive in some cases that it reaches several times its original size and fills the oral cavity, protruding anteriorly between the teeth (Fig. 1). Submaxillary-space involvement is manifested by a rounded, tense, brawny, tender swelling, maximum in the region of the submaxillary gland and limited chiefly to the suprahyoid region of the neck (Fig. 2). This swelling may be unilateral or may involve both sides, depending on the duration of the disease. Fluctuation is rare, having been noted in only 1 of the 31 cases of the previous series and in none of the 20 recent cases.

Clinically, the patient has difficulty with speech, and in extreme cases may be unable to talk. The same is true of swallowing. He may be able to open his mouth only slightly or not at all. Difficulty with breathing is the last complaint chronologically and is evidence that a most critical state has been reached. Patients may well die without ever having complained of respiratory embarrassment. Similarly, cyanosis is infrequent. Patients usually drool at the mouth because of inability to swallow their saliva. Mucus may accumulate in the trachea because the patient is unable to expel the secretions, the airway being narrowed by the swelling higher up.

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Etiology

In the previous report, the source of the infection appeared to be dental in 51 per cent of the cases. It was surprising to discover that some type

Figure 1. *Case 7.*

Swelling and protrusion of the tongue are particularly well shown in this photograph, obtained before operation. Typical submandibular swelling was also present, but is not obvious. Reproduced from Current Researches in Anesthesia and Analgesia[2] *by courtesy of the publisher.*

of dental lesion was apparently the initiating factor in 18 (90 per cent) of the present series. For this reason, the etiologic role of dental lesions in Ludwig's angina should be further publicized.

Dental extractions immediately preceded the onset of symptoms in 12 cases. In 6 other cases, definite dental complaints preceded the illness, but no extraction, filling or other dental procedure had been performed.

The histories in the cases in which dental extractions had been performed are quite similar. The following one is typical.

E. P. (Case 3), a 10-year-old girl, was admitted with typical signs and symptoms of Ludwig's angina. She had noted a toothache 1 week previously, and under novocain anesthesia two molar teeth had been extracted from the right lower jaw 3 days previously. The day after the extraction, she experienced discomfort in swallowing. Swelling was noted in the right submaxillary region. Her dentist advised the application of an ice bag. Twenty-four hours later, the swelling had markedly increased, swallowing had become extremely painful, and the patient could open her mouth only slightly. On the 3rd day following the extraction, her condition was worse. A physician was called and advised immediate hospitalization.

Of equal interest and importance are the histories in those cases that were thought to be of dental etiology but in which no extraction had been performed. The following case is illustrative.

T. C. (Case 14), a 10-year-old boy, was admitted with classic signs and symptoms of Ludwig's angina. His tongue was so swollen that it filled the mouth and protruded between the upper and lower teeth anteriorly

Figure 2. *Case 3.*

Submandibular swelling is the most prominent sign displayed in this photograph, taken prior to operation. Edema of the tongue and elevation of the floor of the mouth, not visible in this picture, were nevertheless present and in a moderately advanced stage.

He could neither talk nor swallow and had difficulty in breathing when lying down. There was marked swelling of the submandibular region, especially on the left. He had begun to suffer from a severe toothache in the left lower jaw 4 days before entry. A day later, he complained of swelling of the left jaw and a sore throat. His condition became steadily worse. A physician saw him 4 days after the onset of toothache and advised immediate hospitalization. Operation was performed shortly after admission. Convalescence was satisfactory. Before the patient was discharged, x-ray examination showed that

caries had invaded the pulp of the left lower first molar tooth. The tooth was extracted, and the patient was discharged completely recovered.

Patients are prone to blame the dentist if Ludwig's angina develops following a tooth extraction. However, the act of extraction is not so important from the standpoint of etiology as is the preexisting septic tooth or mouth from which the subsequent spread of infection arises. The dentist who is unfortunate enough to have performed an extraction on a patient who subsequently develops Ludwig's angina is more likely to have been incidental to the train of events than to have been the responsible agent. Furthermore, there is no doubt that dental extractions occasionally avert the development of Ludwig's angina by removing a dangerous potential source of origin while the infection is still localized.

Whatever may be the etiologic role of dental extractions, the dentist is in a position to do much to prevent the final development of Ludwig's angina. In the first place, it has been fairly well established that many serious post-extraction infections may be avoided by careful preoperative preparation of the mouth.[3-5] In the Dental Clinic of the Boston City Hospital, it was formerly the custom to employ mouth rinses with a 1:2800 solution of Metaphen five minutes previous to extraction. During the past year this routine has been discontinued in favor of zinc peroxide powder, which, in watery suspension, is used as a preoperative mouth wash. If the mouth be extremely foul, it is wise to instruct the patient to apply zinc peroxide powder to his teeth and gums several times daily for several days prior to extraction, during which time the bacterial flora will be modified and the hygiene improved so as to make extraction much less dangerous. Meleney[4, 5] deserves the credit for suggesting this routine. Results at the Boston City Hospital have been gratifying. It seems wise, in this connection, to employ zinc peroxide powder prophylactically in any elective extraction, even though the mouth may appear clean. Details of its use have recently been described by one of us (W. C. G.[3]).

After extraction has been performed, the dentist should be on the alert for signs of impending trouble. Complaints of difficulty in swallowing should be taken seriously. Swelling of the jaw accompanied by even slight induration and elevation of the floor of the mouth calls for effective therapeutic measures. Patients who present this complaint should not be told merely to return home and apply ice packs. Chemotherapy with one of the sulfonamide drugs would, no doubt, be curative in a large number of cases at this stage. The continued use of zinc peroxide is advocated as a post-extraction measure. Early hospitalization should be resorted to if the signs and symptoms progress further.

In the 2 cases not of dental origin, the infections were apparently primary in the pharynx, whence they spread forward and downward to produce the syndrome of Ludwig's angina. These 2 patients had had sore throats prior to onset.

Bacteriology

Streptococci have long been known to predominate as the causative organisms in Ludwig's angina. The presence of other organisms that grow best anaerobically has been mentioned previously.[1] In 16 (80 per cent) of the 20 cases in this series, culture reports were available; streptococci were present in all. In 8 of these cases, Vincent's organisms (fusiform bacilli and spirilla) were demonstrated by smear, showing that they invade along with streptococci. Whether or not the microaerophilic streptococcus described by Meleney[4] was present is not known, since our culture technics were not suitable to its demonstration. However, the presence of both streptococci and Vincent's organisms in 50 per cent of the cases makes it clear that in many cases one is not dealing with a straightforward streptococcal infection, but is faced with a more potent and rapidly progressive process, the synergistic effects of which have been pointed out previously by Meleney.

These bacteriologic findings have a significant bearing on treatment. Since all cultures yielded streptococci, there is a clear-cut indication for sulfonamide drugs during the entire critical period of the disease. The presence of Vincent's organisms explains the foul odor so often characterizing the pus obtained at operation, and accounts for the stinking, extensive slough of the deep tissues often found in advanced cases and always noted at autopsy. We think that chemotherapy alone cannot be relied on in these synergistic infections, but should be made secondary to early radical incision of the area. Such a procedure allows access of air to the infected tissues and makes possible their further oxygenation through the medium of zinc peroxide dressings, thus inhibiting the anaerobes and thereby robbing the infection of its sharpest virulence. Perhaps it is not generally appreciated that, although not absolute anaerobes, Vincent's organisms should be treated as such since they thrive and are most dangerous under anaerobic conditions.

Other organisms such as staphylococci, which are not infrequently cultured from these wounds, are incidental and not of primary importance. No special measures as a rule need be taken on their account.

TABLE 1. *Summary of Data in 20 Cases of Ludwig's Angina.*

Case No.	Age	Sex	Interval from Onset to Operation	Dental History	Sulfonamide Therapy	Preliminary Exposure of Trachea	Tracheotomy	Operation	Anesthetic	Dressings	Secondary Closure	Hospitalization	Result
	yr.		*days*									*days*	
1	19	F	2	Extraction of 5 lower teeth	Sulfathiazole	Yes	No	Bilateral	Local and Pentothal	Zinc peroxide	6 mo. later	18	Living
2	63	M	1	None	None	Yes	No	Right side	Local and Pentothal			1	Dead
3	10	F	3	Extraction of 2 lower molar teeth	Sulfathiazole	No	Yes	Bilateral	Local and Pentothal	Zinc peroxide	No	38	Living
4	15	F	2	Toothache in right lower jaw	Sulfanilamide	Yes	No	Right side	Local and Pentothal	Chlorinate packs	No	30	Living
5	12	M	1	Extraction of lower molar tooth	Sulfanilamide	No	No	Bilateral	Pentothal	Zinc peroxide	No	21	Living
6	19	M	4	Extraction of lower molar tooth	Sulfathiazole	No	Yes	Bilateral	Local and Pentothal	Boric solution	No	5	Dead
7	21	F	5	Extraction of lower molar tooth	Sulfanilamide	Yes	No	Bilateral*	Local and Pentothal	Zinc peroxide	No	18	Living
8	38	M	7	Swelling of gums, right molar region	None	Yes	Yes	Bilateral	Pentothal	Zinc peroxide	No	11	Living
9	22	F	5	Toothache in lower jaw	None	Yes	No	Left side	Local and Pentothal	Hydrogen peroxide	No	9	Living
10	22	F	3	Extraction of lower premolar tooth	Sulfathiazole	Yes	No	Left side	Local and Pentothal	Zinc peroxide	8 days later	12	Living
11	27	M	3	Extraction of lower molar tooth	Sulfathiazole	Yes	No	Bilateral	Local and Pentothal	Zinc peroxide	No	17	Living
12	52	M	2	Toothache in left lower jaw	Sulfanilamide	No	No	Left side*	Pentothal	Azochloramid	No	23	Living
13	28	M	12	Extraction of lower molar tooth	Sulfanilamide	No	No	Bilateral	Evipal	Boric solution	No	20	Living
14	10	M	4	Toothache of left lower jaw	Sulfathiazole	No	Yes	Left side	Local and Pentothal	Zinc peroxide	No	32	Living
15	29	M	5	Extraction of lower molar tooth	Sulfanilamide	Yes	Yes	Right side	Local and Pentothal	Chlorinate packs	No	23	Living
16	19	F	5	Toothache in lower jaw	Sulfanilamide	Yes	Yes	Bilateral*	Local and Pentothal	Dakin's solution (half strength)	6 mo. later	12	Living
17	36	F	6	Extraction of 4 lower molar teeth	Sulfanilamide	Yes	No	Right side	Local and Pentothal	Dakin's solution (half strength)	No	9	Living
18	26	F	2	Extraction of lower molar tooth	None	Yes	Yes	Bilateral*	Local and Pentothal	Dry gauze	2 mo. later	17	Living
19	17	M	4	Extraction of lower premolar tooth	Sulfathiazole	Yes	No	Left side	Local and Pentothal	Zinc peroxide	No	17	Living
20	58	M	2	None	Sulfathiazole and sulfadiazine	No	Yes	Bilateral	Local and Pentothal	Iodoform gauze	No	22	Living

*One submaxillary gland removed.

Complications

Respiratory obstruction has been cited as the most imminent and potentially dangerous complication of Ludwig's angina.[1] The employment of tracheotomy or preparation for tracheotomy as a preliminary to operation is the surest and most effective means of circumnavigating respiratory difficulties. One patient (Case 2) in the present series died on the operating table directly from respiratory obstruction.

The second and only other fatality (Case 6) was associated with tracheotomy. A preliminary tracheotomy was performed. The operation went well and convalescence was satisfactory until the third postoperative day, when profuse hemorrhage occurred in the tracheotomy wound. This was apparently due to a ligature's slipping from a small blood vessel that had been ligated at operation. Before the hemorrhage could be controlled, the patient had aspirated such a large amount of blood that he became cyanotic and dyspneic. He died two days later of bronchopneumonia, which appeared soon after the hemorrhage and seemed to result from the presence of retained blood and mucus in the air passages.

The decrease in complications parallels reduction of mortality in the previous series as compared with this one. Prompt and fearless employment of tracheotomy and immediate adequate drainage doubtless account for this reduction. The sulfonamide drugs have probably played a part in the good results, but their role is impossible to measure exactly.

Treatment

The aims of treatment, as previously stated,[1] are "to establish an adequate airway, to relieve tension, to secure drainage and to combat the infection by supplementary measures."

Surgery

We have come to believe that establishing an airway is of first importance. No doubt this can be accomplished in some of the early cases, through intubation, that is, catheterization of the trachea through the nasal or oral cavities via the larynx. If it can be done, this measure is sound and sufficient. However, it presupposes an early case with minimal swelling about the oral and pharyngeal cavities, and such cases are few, since the patients as a rule are not referred to the hospital until their plight is bordering on the desperate. Also, the services of an expert in the art of intubation are essential, and such experts are not plentiful outside of specialized centers. Intubation was attempted in 2 patients in this series. In both cases intubation was resorted to because of deep cyanosis and obstruction of the airway, which developed on the operating table toward the end of the procedure. The tube was successfully passed in one patient (Case 11), who recovered. In the other (Case 2), intubation was not successful and the patient died. Anyone familiar with endotracheal intubation is aware of the fact that passage of the tube is often associated with severe spasm of the larynx. If intubation in Ludwig's angina is unsuccessful, the resulting spasm may easily cause an immediate fatality through asphyxiation. Tracheotomy would then be too late. Where it becomes necessary to establish an airway, tracheotomy exclusively is safer in view of these hazards associated with endotracheal intubation. The value of and indications for tracheotomy were discussed in some detail in the previous report.[2] Further experience with these cases has convinced us that the state of the airway cannot be accurately evaluated by the signs and symptoms ordinarily relied on. More important, it is impossible to predict the behavior of the airway under anesthesia, for spasm may intervene, completely obstructing what before operation seemed to be a fairly free passage.

These difficulties were partially recognized in the previous papers,[1, 2] wherein exposure of the trachea preliminary to operation on the infected areas was advocated in cases where signs of respiratory difficulty were noted beforehand. This assumes that one can evaluate the present and future state of the airway on the basis of respiratory signs and symptoms, an assumption that we now know to be fallacious.

Accordingly, we have come to believe that in every case, prior to incising the suprahyoid region, a preliminary exposure of the trachea should be completed. For this purpose, a transverse incision 5 cm. in length and 2.5 cm. above the superior border of the sternum is made. A transverse incision is preferred because it avoids the infected tissues higher in the neck. Local anesthesia (with 1 per cent novocain) is employed. The anterior aspect of the trachea is cleanly exposed at about the level of the thyroid isthmus. This wound is then packed with vaseline gauze, protected with a sterile towel, and the main operation performed. If respiratory obstruction becomes apparent at any time, the pack is removed from the wound in the lower neck, the trachea is quickly incised, and a tracheotomy tube is inserted. Careful hemostasis, secured during the preliminary exposure of the trachea, assures one of a dry field through which the trachea can be entered. Oxygen may then be given by catheter through the tracheotomy tube and the main operation continued.

Whenever patients have respiratory obstruction previous to operation, as evidenced by dyspnea, cya-

nosis, orthopnea or crowing respirations, not only should the trachea be exposed, but tracheotomy should be completed before any other operative procedure is attempted. To do otherwise is to court death.

In 13 (65 per cent) of the cases in this series, preliminary exposure of the trachea was performed. In 9 of them, it was not found necessary to complete the tracheotomies. All these patients recovered. In 4 cases, tracheotomy had to be completed while the patient was still on the operating table. Three of these patients recovered and 1 (Case 2) died at the completion of the operation. Respiratory obstruction supervened at this point, apparently on account of spasm. Instead of immediately completing the tracheotomy, which could have been simply and quickly done since the trachea had already been exposed, endotracheal intubation was attempted, for some reason that is not clear. This precipitated further spasm and respiratory obstruction. The catheter could not be passed. The attempt at intubation was abandoned and the tracheotomy completed, but irreversible changes had already taken place, and the patient could not be revived. We regard this as a preventable death.

In 4 cases, tracheotomy was performed as a preliminary to the main operation, the preoperative clinical picture indicating impending respiratory obstruction. The operative course was uneventful in each of these cases. One of the patients (Case 6), already referred to, died from a hemorrhage in the tracheotomy wound. Such an accident is extremely rare in the experience of most surgeons. The possibility of its repetition is sufficiently remote so that we have no hesitancy in continuing to recommend tracheotomy when the clinical picture warrants it.

In the remaining 3 cases, the operation was performed without prior tracheotomy or preliminary exposure of the trachea. The operative courses were uneventful, and all patients survived. In view of wider and more recent experience, we should not be inclined to take such chances again in spite of the good results in these cases.

Surgical technic. Immediate surgical drainage is indicated in any case that has progressed to the point of fulfilling the diagnostic criteria of Ludwig's angina. The sulfonamide drugs, although doubtless of great benefit, have not altered our attitude in this matter. The arguments for immediate surgery were detailed in a previous report[1]; the operative technic was likewise described fully. Therefore, only a brief outline of the surgical procedure will be included in this paper.

After preparing and draping the neck, an incision is made parallel to and 1.5 cm. below the body of the mandible, beginning 1 cm. in front of the angle of the jaw and extending anteriorly to just beyond the midline, if the infection is unilateral. If the infection involves both sides of the neck, the incision is continued around almost to the angle of the jaw on the opposite side. It divides the skin, the superficial fascia and the platysma muscle. The deep cervical fascia and the mylohyoid and anterior bellies of the digastric muscles are also cut through. In this manner, the submaxillary and sublingual spaces are widely opened and drainage is thus secured. The submaxillary gland is in plain view and should be removed if it appears to be involved in the septic process. Sometimes pus is found above and posterior to the submaxillary gland. In such cases, the gland should be removed to facilitate drainage. At this juncture, the exploring finger lies directly under the mucous membrane of the floor of the mouth anteriorly and can be passed into the parapharyngeal space posteriorly. Pus will occasionally have dissected back into the latter space.

Postoperative dressings. In a few cases, at the completion of the operation, we placed from 5 to 8 gm. of sulfanilamide crystals in the depth of the wound and loosely packed the wound with iodoform gauze. Limited experience does not permit evaluation of this local use of sulfanilamide, but considering the types of organisms known to inhabit these wounds and the good results obtained with the drug in other wounds, further trial of this type of dressing is recommended.

The first dressing is changed at the end of twelve to twenty-four hours, all bleeding usually having ceased by that time. What type of dressing to use thereafter can best be answered by the bacteriologic studies. If only streptococci are reported from the wound culture, it is probably best to continue with the local use of sulfanilamide crystals, with an overlying saline-soaked gauze dressing. If Vincent's organisms are shown to be present, we strongly recommend shifting to zinc peroxide dressings. The latter must be carefully made and changed at least every four hours if good results are to be obtained. If properly managed, zinc peroxide dressings will yield a clean, odorless wound in an unbelievably short time. For the technic of these dressings, the reader is referred to the papers of Meleney.[4, 5]

In order to obtain the necessary bacteriologic data on which to base future treatment, wound cultures as well as smears must be made at the time of operation. It is necessary to take the smears separately, for it is by this means that Vincent's organisms are demonstrated. They will not grow on ordinary culture mediums.

Secondary closure of the wound is advisable in some cases where the skin edges gape apart, but

this is not the rule. If dressings have been made skillfully, resuture should be feasible by the eighth day. Such closures were performed in 2 cases of this series on the eighth and twelfth postoperative days, respectively. In 3 other cases, the patients were readmitted several months later, when plastic procedures were carried out to eliminate the scars. If the wound edges are not approximating well, early resuture is simpler, saves the patient a second hospitalization, and gives a good cosmetic result. Incisions made for preliminary exposure of the trachea may be resutured on the third or fourth postoperative day, or as soon as it is clear that the potential need of tracheotomy has passed. It is, of course, assumed that it has not been found necessary to complete the tracheotomy in these cases.

A word regarding the care of the tracheotomy opening is not amiss. A suction machine at the bedside is essential so that the trachea and tube can be suctioned free of mucus or blood whenever such accumulations occur. The inner cannula of the tube should be removed and washed several times daily. The opening must be protected from contamination from the septic discharges of the wound above. Ordinarily, tracheotomy tubes can be removed on the third or fourth day, for the swelling about the pharyngeal and oral airways has usually subsided for the most part by that time. Obviously, it is desirable to remove the tube as soon as it can safely be done.

Use of Sulfonamides

We have been unable to control the disease in any case with sulfonamide therapy alone. In all cases in which sulfanilamide was used 2 gm. (30 gr.) was given on entry and 1 gm. (15 gr.) every four hours thereafter. In 1 case (Case 13) the patient was treated in the hospital for seven days with sulfanilamide. During this time, the disease progressed so as finally to require surgery. In 2 other cases (Cases 15 and 17), the patients were treated with sulfanilamide for three days, during which time each became worse. Both were operated on. Another patient (Case 20) grew worse at an alarming rate, so that radical operation was necessary in less than twenty-four hours. The findings on admission were minimal and a diagnosis of Ludwig's angina could not be made until the next day, by which time 3 gm. (75 gr.) of sulfanilamide had been administered. In view of these experiences, it is distinctly dangerous to convey the impression that chemotherapy alone will abort the disease and bring about a cure. This may happen in a few cases, but it is certainly not the rule. We regard the sulfonamide drugs only as valuable adjuncts to surgical treatment. They should not be relied on alone in any fully developed case of Ludwig's angina.

Sulfonamides were administered either orally, parenterally or by both methods in 16 (80 per cent) of these cases. Sulfathiazole was used in 7 cases and sulfanilamide in 8. In 1 case, sulfathiazole was employed preoperatively and sulfadiazine postoperatively. In most cases, the dosage was 15 gr. every four hours. No superiority of any one drug over the others was noted, and it would be extremely difficult to establish such an evaluation, since the disease is relatively uncommon. Judging from what is known of the action of the various sulfonamides in relation to bacteriology, sulfathiazole or sulfadiazine appears to be preferable to the others for either oral or parenteral administration.

No complications due to chemotherapy were observed.

In 4 cases, no sulfonamide was administered. One of these patients (Case 2) was operated on shortly after admission and died on the operating table, so that there was no opportunity for such therapy. The other 3 patients recovered satisfactorily without the administration of sulfonamides. There is no tangible difference in the courses of the patients who received such therapy and of those who did not. However, we strongly recommend the use of one of the sulfonamide drugs on the basis of their more obvious beneficial results in inflammatory conditions elsewhere in the body, and because of the apparently universal presence of streptococci in the wounds of patients suffering with Ludwig's angina.

Anesthesia

In the previous communications,[1, 2] the choice of anesthetic methods was discussed at length. It was suggested that on the basis of experience then available, together with a knowledge of the obstructive changes that involve the airway, a combination of local anesthesia and Pentothal Sodium or Evipal is best. It is recommended that the trachea be exposed or tracheotomy completed under local anesthesia (local infiltration with 1 per cent procaine). This having been done, and an airway or potential airway thus assured, Pentothal Sodium should be administered intravenously and the incision and drainage carried out under the latter type of anesthesia, nasal oxygen being given during this second phase of the procedure. Procaine is injected only in the area of the tracheotomy, and none is used in the submandibular region. For complete details, the reader is again referred to the previous reports.

The intravenous barbiturates were employed in all 20 cases of this series — Pentothal Sodium in 19 cases and Evipal in 1. In 17 cases either tracheotomy or preliminary exposure of the trachea, per-

formed under local anesthesia, preceded the administration of Pentothal Sodium. One of these patients (Case 2) died on the operating table; this death has already been discussed. Since prompt completion of the tracheotomy would most probably have saved this patient, the death is attributable to faulty judgment rather than to the anesthetic agent. It has been stated above that in 3 cases where preliminary exposure of the trachea had been performed, completion of the tracheotomy became necessary during the operative procedure because of respiratory difficulties. That these difficulties arose from mechanical obstruction of the airway rather than from suppression of respirations by the anesthetic agent is evidenced by the fact that in each case tracheotomy was followed by immediate improvement. In 4 cases where tracheotomy was performed initially, no respiratory difficulties were noted at any time. This further substantiates our belief that Pentothal Sodium is not a dangerous agent in these cases if proper steps have been taken to provide a patent airway. In no case where the airway was patent was any respiratory difficulty experienced.

In 3 cases the operation was performed without preliminary exposure of the trachea or tracheotomy. No respiratory difficulties were encountered and all the patients survived. Pentothal Sodium was used in 2 cases and Evipal in 1 because the patient had received sulfanilamide for seven days prior to operation. It has been suggested that dangerous results may ensue from the administration of Pentothal Sodium to patients who have been receiving sulfonamides.[6] However, in 3 other cases where sulfonamides had been administered up to 3 days preoperatively, Pentothal Sodium was used and no ill effect was noted. We do not believe that we have proved or disapproved the suggested incompatibility of Pentothal Sodium and the sulfonamides. However, we should have no hesitation in administering the former under such circumstances. It is perhaps safest to regard the question as still unsettled. If Evipal is available, there is certainly no objection to its use.

Summary

Experiences with Ludwig's angina in a series of 20 cases are related in view of the findings in 31 cases previously reported.

The mortality in the present series was 10 per cent, compared with 54 per cent in the earlier series.

Criteria for diagnosis are presented briefly.

Emphasis is placed on the role of the teeth and dental procedures as etiologic factors.

Streptococci were present in all cases, and both streptococci and Vincent's organisms in 8 of the 16 cases in which bacteriologic studies were made. Employment of both cultures and smears taken at operation is urged as a basis for the choice of dressings postoperatively. Zinc peroxide dressings are recommended when anaerobes are demonstrated.

Radical surgery as soon as the diagnosis is established is advocated.

The surgical technic is outlined. Preliminary exposure of the trachea or tracheotomy prior to operation is advised in every case. Intravenous Pentothal Sodium is recommended as the anesthetic agent of choice.

The use of sulfonamide drugs, either orally or parenterally, is strongly favored. Dependence on sulfonamides without surgery, however, is discouraged.

Under the regime advocated, the ordinary complications of Ludwig's angina have virtually been eliminated.

References

1. Williams, A. C. Ludwig's angina. *Surg., Gynec. & Obst.* 70:140-149, 1940.
2. Williams, A. C., and Marcus, P. S. Choice of anesthesia in Ludwig's angina. *Anesth. & Analg.* 20:160-170, 1941.
3. Mallett, S. P., and Guralnick, W. C. Zinc peroxide in treatment of mouth infections. *J. Am. Dent. A.* 29:384-388, 1942.
4. Meleney, F. L. Prophylactic and active use of zinc peroxide in foul smelling mouth and neck infections. *Ann. Surg.* 107:32-38, 1938.
5. *Idem.* Use of zinc peroxide in oral surgery. *Internat. J. Orthodontia* 23:932-940, 1937.
6. Adriani, J. Effects of anesthetic drugs upon rats treated with sulfanilamide. *J. Lab. & Clin. Med.* 24:1066-1071, 1939.

CLINICAL NOTES

SURVIVAL FOR FOUR YEARS FOLLOWING DISSECTING ANEURYSM OF THE ABDOMINAL AORTA

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THE correct ante-mortem diagnosis of dissecting aneurysm of the abdominal aorta is no longer an entirely adequate reason for reporting a case, except to emphasize the possibility of such a diagnosis; but the combination of a correct ante-mortem diagnosis, recovery, and survival and economic usefulness for four years, death from a cause other than the aneurysm, and post-mortem confirmation of the diagnosis makes the following case worthy of more than casual attention. Cases have been described where a "double-barreled aorta" of obviously long duration has been found at autopsy, but in no such case, so far as I can find, has the condition been diagnosed during life and a survival period of four years determined.

CASE REPORT

J. X. H., a 57-year-old man, was admitted to the Lawrence General Hospital on February 1, 1938.

There had been persistent pain in the back since January 20, when, after watching some exciting boxing, the patient felt the sudden onset of severe pain between the scapulas, which spread to the substernal region. He was brought to the office where he paced the floor, obviously in severe pain. The temperature was 96°F., the pulse 80, and the blood pressure 260/140. The white-cell count was 8000. The lungs were clear and examination of the heart was essentially negative. Examination of the abdomen was negative except for slight tenseness in the epigastrium, with no accompanying tenderness. The pain was severest in the back. There was no dyspnea, orthopnea, cyanosis, tachycardia, sweating, ashen pallor, nausea or vomiting. It was thought that the patient had a coronary thrombosis and he was given ¼ gr. of morphine sulfate intravenously, with complete relief of the chest pain but incomplete relief of the pain in the back. He was taken to the home of his sister-in-law, where he was again given, within ½ hour of the first dose, ¼ gr. of morphine sulfate intravenously, but still without complete relief. He was confined to bed, given morphine whenever necessary for his pain, a liquid and soft-solid diet, and special nursing care.

On the next day the temperature began to rise and the white-cell count was 12,000. On January 22 the temperature was still elevated, the white-cell count was 18,000, and an electrocardiogram showed a diphasic T-wave in Lead 4 but no definite sign of coronary disease (Dr. Joseph Nicholson). The blood pressure, which had been taken every 2 hours, gradually fell to 152/98 on the afternoon of January 21, and then gradually rose to 200/120. On January 22 the diagnosis of dissecting aneurysm of the aorta was made.

The patient continued to have severe pain requiring medication every 3 to 5 hours, the pain gradually descending until it localized in the lower back. He perspired freely and complained that back rubs were unpleasant and painful, although deep pressure was not disturbing. Lying on his back increased the pain.

The urinary volume gradually decreased, and on January 23 the patient passed only 390 cc. of highly concentrated urine, containing a very slight trace of albumin, no sugar and a large number of granular casts with an occasional red and white cell. Repeated urine specimens taken later contained a similar amount of albumin although somewhat fewer casts. After January 23, the urine volume increased.

On January 27, a thrill was felt high in the epigastrium, slightly to the left, over a palpable pulsation of the abdominal aorta. Over the aorta, especially in its upper part, was a loud bruit, systolic in time. After examination of the epigastrium the pain was much worse.

The rectal temperature persisted at about 101°F., with a slight tendency to drop within the last few days before admission. Between the onset of illness and admission to the hospital (12 days) the patient received 12⅓ gr. of Pantopon and nearly 4 gr. of morphine sulfate, not counting the two initial ¼-gr. doses.

The patient's father died at 55 years of unknown causes. The mother died of dropsy. One brother died at 50 years of "shock." Two sisters were living and well. The patient's wife died of "high blood pressure" at 50 years. Two children were living and well. One child was born dead, and there had been two miscarriages. The patient had had a "nervous breakdown" lasting 6 weeks, 10 years previously.

The patient was able to lie on his back without acute distress or pain. He appeared somewhat drawn and showed signs of having lost some weight recently. The lungs were normal. The heart was somewhat enlarged to the left, and the supracardiac dullness was 8 cm. wide in the 2nd interspace with its right border at the right border of the sternum. The sounds were of good quality. The aortic second sound was increased and was greater than the pulmonic. The rhythm was regular. There was a soft systolic blow at the apex, but no murmurs at the base. Examination of the abdomen was negative except for pulsation of the abdominal aorta throughout its length. A loud systolic bruit could be heard over the aorta, with diminishing intensity in the lower abdomen. In the epigastrium, just to the left of the midline, there was an easily palpable thrill, synchronous in time with the bruit. The extremities were normal.

Repeated x-ray films were negative. The red-cell count was 4,370,000 with a hemoglobin of 89 per cent (Sahli). On entry, the white-cell count was 20,200, with 83 per cent neutrophils, 1 per cent eosinophils, 8 per cent small monocytes and 8 per cent large monocytes. On February 21, it was 9200. The nonprotein nitrogen was 33.6 mg. per 100 cc. A blood Hinton test gave a negative reaction. The urine on admission was amber and acid, with a specific gravity of 1.022, a slight trace of albumin and no sugar. On February 13 it was yellow and acid, with a specific gravity of 1.023, the

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slightest possible trace of albumin and no sugar. There were a moderate number of white blood cells and an occasional epithelial cell in the sediment.

On February 16, or 27 days after onset, the patient became sufficiently free of pain so that morphine was no longer necessary; the thrill over the aorta was no longer palpable. On March 1 he was allowed to sit in a chair and later to take a few steps to the bathroom. He was discharged by ambulance to a convalescent home on March 4. The bruit over the aorta was still audible.

About 6 months after onset, the patient gradually resumed his duties as foreman in a textile mill and continued reasonably well until February 10, 1941, when he had a pontine cerebral hemorrhage, with severe headache, mental confusion, nausea, vomiting, contracted pupils, slowed respirations, left facial palsy, left deviation of the tongue, partial deafness and at one time a blood pressure of 300/130. He returned to work in 2 months and continued until January 20, 1942, when he had his first attack of severe paroxysmal dyspnea. He died on January 23 in a similar attack.

Autopsy (Dr. Donald A. Nickerson). The heart was moderately enlarged, measuring 12.5 by 10.8 by 7.5 cm. The epicardial surface was smooth and glistening, and covered by a small amount of fat. The myocardium was firm and reddish-brown, showed relatively little gross scarring and was not remarkable except that the left ventricular wall presented a definite degree of concentric hypertrophy, so that the wall averaged 2.0 cm. in thickness. The chambers were lined by smooth and glistening endocardium, and the valves were normal except for a few small plaques at the bases of the aortic leaflets. The coronary ostia were present, and the vessels showed moderate atheromatous deposits, with narrowing of the lumens but no evidence of complete occlusion.

The aorta was dissected out with the heart to the bifurcation of the iliac vessels. It was of approximately average size as it lay in situ. When opened the thoracic portion was of average width and showed scattered atheromatous plaques, which were more numerous in the distal portion; these, for the most part, had a yellowish-gray, raised appearance, with occasional foci of calcification. In the lumbar portion, at a point 3.5 cm. above the celiac axis artery, there was an oval aperture 2.0 cm. in length and 0.6 cm. in its greatest width, the axis of which was parallel to that of the aorta. Its margins were lined by somewhat rolled, curled, glistening, yellowish-tan tissue, and it led into a sac that paralleled the entire remaining portion of the aorta. Proximal to the opening of the dissecting aneurysm there was a firm, semicalcified, bulging mass measuring 3.5 by 3.0 cm., partially filled with laminated blood clot in its upper margin but for the most part covered with smooth, glistening and granular yellowish-gray tissue. From this point downward there was a partially encircling, dissecting sac, the lining surface of which was ragged, granular, yellowish-gray and marked by numerous atheromatous plaques. The aorta in this region showed somewhat more marked atheromatous change than it did in the thoracic portion, with occasional longitudinal furrowing, but there was no occlusion of the orifices of the major vessels or pearly-gray plaques about their mouths. The degree of atheromatous change was somewhat more marked in the aorta than in the dissecting aneurysm. At the bifurcation of the vessels the sac of the dissecting aneurysm passed under the aorta and coursed beneath the origin and proximal 4.5 cm. of the right iliac artery. At that point there was a re-establishment of a common channel as the channel of the dissecting aneurysm dissected upward and joined with the iliac artery.

Summary

A case of dissecting aneurysm of the abdominal aorta is described in which the patient recovered and was able to work for nearly four years. The original diagnosis was confirmed at autopsy.

5 Third Street

A SIMPLE TIDAL-DRAINAGE UNIT

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BOSTON

As a result of the war, the subject of tidal drainage is beginning to receive more widespread attention than formerly. This has been occasioned by the increased interest that has centered about the management of patients with traumatic lesions of the spinal cord.

The use of tidal drainage to manage the neurogenic bladder resulting from this condition was introduced by Munro and Hahn[1] in 1935. This and the other indications for the use of tidal drainage will not be discussed in this paper. Munro,[2] in 1936, designed an apparatus for tidal drainage, which has since been modified by others (Hyams and Buchtel,[3] Vary[4] and Bellis[5]). Each modification has been designed to simplify the complexity of the apparatus and the care that it requires.

It is the purpose of this paper to present an apparatus that operates on the same principle. It is easy to construct and constitutes a single piece of apparatus that can be readily operated by one unfamiliar with the working principles of tidal drainage.

The apparatus described below is suitable for hospital use and allows easy cleansing and sterilization. However, the use of nonbreakable materials would make it applicable for field-hospital work as well.

An apparatus designed for tidal drainage, besides being simple in construction, should embody the following characteristics: it should be possible for the bladder to be filled to any desired tension, and to be completely emptied after this pressure has been obtained; and it should be possible to allow a period of rest before the bladder is again filled.

Method of Construction

An apparatus that fulfils all these requirements can be constructed with glass tubing of two different diameters. It can be built to any size, de-

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pending on the volume and pressure desired. For irrigating the urinary bladder, the following specifications have been found to be satisfactory.

A piece of 25-mm. glass tubing 62.5 cm. in length is closed at each end with a No. 4 two-holed rubber stopper. This is referred to as the column. A

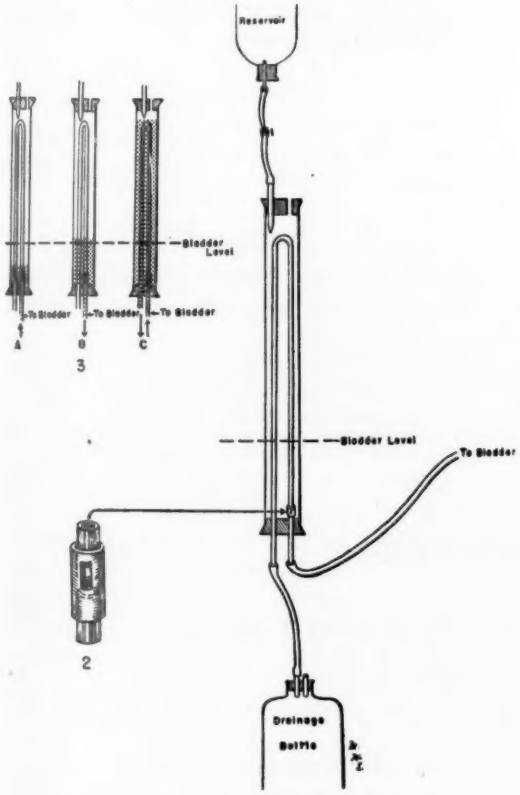

FIGURE 1.

1 — *Complete unit.* 2 — *Detail of siphon adjustment.* 3 — *Different phases of operation:* (a) *resting;* (b) *filling;* (c) *emptying.*

piece of 6-mm. glass tubing, 110 cm. long, is bent 50 cm. from one end, so that it forms a U with arms of unequal length, and so that it will fit within the column. This is the siphon. Its longer arm projects through one hole of the lower stopper (Fig. 1 – *1*), and is adjusted in this position so that the shorter arm ends 1.2 cm. above the stopper, directly over the second hole. A 7.5 cm. piece of 6-mm. glass tubing is then placed in the second hole, so that the upper end is separated from the short end of the siphon by 3 mm. A segment of 6-mm. rubber tubing 1.9 cm. long is used to connect these ends. A narrow window 6 mm. long is cut in one side of the rubber tube. The bore of the tube is then stretched so that when in position it can be easily moved up and down. By varying the size of the portion of the window that overlies the gap between the two tubes, one can adjust the size of the aperture between the siphon and the column (Fig. 1 – *2*). An adjustment producing a hole 1 or 2 mm. in diameter is satisfactory.

At the upper end of the column, one of the two holes in the stopper is left open to act as an air vent. The other hole contains the glass inflow tube, which allows fluid to enter the column. The end of this tube is drawn out to a diameter of 1 or 2 mm., so that the rate of inflow can be observed and regulated.

METHOD OF OPERATION

A large reservoir containing the irrigating fluid is connected to the inflow tube with rubber tub-

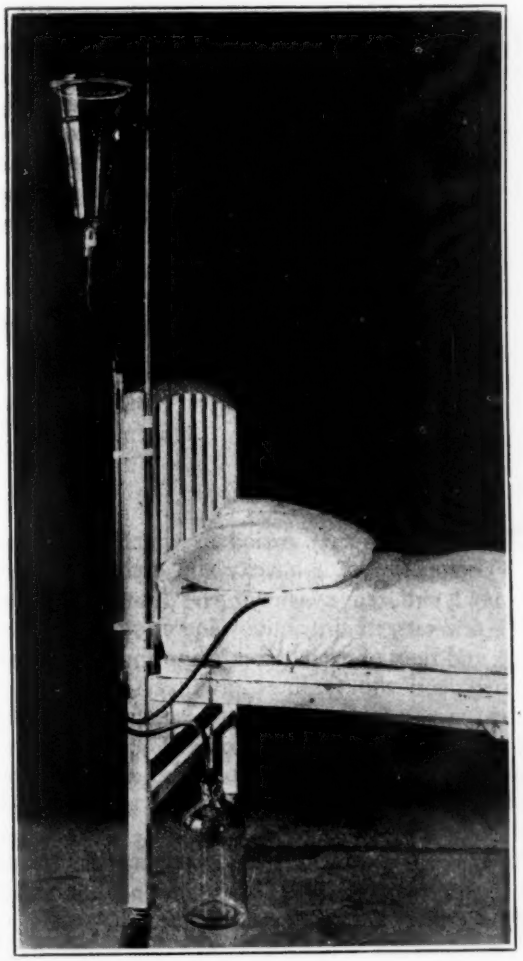

FIGURE 2. *Apparatus Connected for Use.*

ing, and controlled with a constricting clamp (Fig. 2). The short glass tubing at the base of the column is connected to the bladder, and the long arm of the siphon, which protrudes through the stopper, is connected to the drainage bottle, where it ends as a short piece of glass tubing in another two-holed stopper.

When the clamp is opened fluid flows into the column. The fluid has direct access to the bladder through the hole in the side of the siphon. When the fluid level in the column rises above bladder level, as in Figure 1–*3b*, the bladder begins to fill and the pressure within the bladder rises. This pressure may be observed and measured in the short arm of the siphon.

When the fluid in the column and that in the short arm reaches the level of the siphon curve, the fluid flows into the descending siphon arm and the bladder is emptied. Simultaneously the fluid is siphoned from the column through the small hole in the side (Fig. 1–*3c*). The emptying time of the column must be sufficiently long to allow the bladder to empty completely. When the column is empty, air enters the siphon and breaks the circuit. Then the level of the fluid in the column is below that of the bladder (Fig. 1–*3a*), and if the emptying has been incomplete, the column immediately fills to bladder level. In this event, the hole in the side of the siphon must be decreased in size so that the column empties more slowly. The bladder remains at rest until the fluid in the column again reaches bladder level.

The hole in the side of the siphon should be as large as is compatible with complete emptying of the bladder, for excessive constriction makes the apparatus more easily tripped by sudden changes of abdominal pressure.

Intravesicular pressure is adjusted by changing the level of the entire unit.

Summary

The construction of a simple, inexpensive apparatus for tidal drainage is described, and its use is discussed.

References

1. Munro, D., and Hahn, J. A. Tidal drainage of urinary bladder: preliminary report of this method of treatment as applied to "cord bladders" with description of apparatus. *New Eng. J. Med.* 212:229-239, 1935.
2. Munro, D. "Cord bladder": its definition, treatment and prognosis when associated with spinal cord injuries. *J. Urol.* 36:710-729, 1936.
3. Hyams, J. A., and Buchtel, H. Modification of the Munro tidal drainage apparatus. *Am. J. Surg.* 52:86-88, 1941.
4. Vary, E. P. Tidal irrigator. *Surgery* 7:410-416, 1940.
5. Bellis, C. J. Improved apparatus for tidal drainage of the urinary bladder, and empyema cavities. *Surgery* 8:791-797, 1940.

MEDICAL PROGRESS

ISOTOPES IN MEDICAL INVESTIGATION AND THERAPY*

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THE preliminary period in which radioactive isotopes were a novelty and each newly discovered radioactive element was immediately fed to a few rats, its distribution in various bodily tissues and rates of excretion in urine and feces determined, and the findings promptly published is drawing to a close. Today the isotope-tracer technic is no longer a novel toy to be employed in new and unique situations, but a precise and irreplaceable method of studying complex problems of metabolism, physiology and disease. Investigators who have spent many years applying the classic investigative procedures are now adapting the isotope-tracer method to their research, and as a consequence are making advances that would have required years to achieve or have been impossible with the methods previously at their disposal. The stable or heavy isotopes (which can be detected because of the differences in their atomic weights) have been used primarily as markers in organic molecules, and have made their greatest contributions in the study of the intermediary metabolism of fat, protein and nitrogenous substances. Unstable or radioactive isotopes of almost all the elements have been made by cyclotron bombardment or atom-smashing. To date their greatest usefulness has been in investigations of the metabolism of ions and inorganic substances.

It should be emphasized that atoms, not molecules or compounds, are made radioactive. Only by incorporating such atoms in molecules, compounds or tissues can the latter be labeled with a radioactive substance. Incorporation of isotopes in molecules or compounds can be accomplished by chemical methods (for example, the labeling of sodium chloride by making it from radioactive sodium) or by allowing an organism to use an isotope as a building stone for the formation of a complex organic substance or a tissue that will contain the labeled atom. Thus, if an anemic subject is fed radioactive iron, this isotope is built into hemoglobin contained in newly formed eryth-

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rocytes, and serves to label not only the hemoglobin molecule but the erythrocyte itself.

The medical applications of these labeled substances, varying in complexity from simple inorganic ions to entire physiologic units such as the erythrocyte, are extremely numerous and the literature reporting them now runs into some four hundred articles. The impracticability of summarizing such a number of data is obvious, and consequently only those subjects that have appeared to be of immediate clinical interest are reviewed in this report.

Stomach

Gastric secretion and absorption are poorly understood, in spite of the intensive investigations of gastric physiology made during the last fifty years. The isotope-tracer technic appears to be an ideal means of following the transfer of ions and molecules across the gastric mucosa, since the few experiments already performed by this technic have yielded striking and valuable information.

Cope and his associates have continued their studies of gastric physiology using radioactive sodium and heavy water as tracer substances. In their first series of experiments, they[1] introduced solutions containing radioactive sodium in the form of sodium chloride into the gastric pouches of dogs, and followed the appearance of the radioactive material in the blood stream. Significant amounts of sodium were absorbed within fifteen minutes, but the total amount absorbed varied remarkably depending on which portion of the stomach had been used in making the pouches. In a period of one hour only 1 to 7 per cent of the radioactive material was absorbed from the pouches made in the body or acid-secreting portion of the stomach, whereas as much as 50 per cent was absorbed from the alkaline-secreting antral pouches. Much less sodium was absorbed from the body of the stomach during the secreting phase than during the resting phase, but the state of secretory activity had little effect on absorption from the antral region. Variations in the osmotic pressure of the sodium chloride solutions or in the electrolyte concentrations in the blood serum had no significant effect on the absorption.

The absorption of water from the stomach was studied by determining the rate of disappearance of heavy water (water containing the heavy isotope of hydrogen) from the gastric pouches.[2] Absorption from both body and antral pouches was rapid, 50 per cent of the heavy water being taken up in approximately twenty minutes, although none of the labeled material remained in either pouch after two hours. The functional state of the gastric mucosa had no effect on the absorption.

These interesting and extremely important experiments indicate the futility of assuming that analyses of the gastric contents give an adequate picture of the secretory activity of the stomach. The concentrations of various constituents in the gastric contents actually represent the result of an equilibrium between the simultaneous processes of secretion and absorption. The rapid transfer of water through the gastric mucosa easily explains the constant state of isotonicity of the gastric contents, and makes it unnecessary to assume that the secretory products of the mucosal cells are isotonic at the time of delivery into the stomach.

Other evidence that the stomach can take an active part in absorption is given in the experiment reported by Hahn and Whipple[3] in which a solution containing radioactive iron was placed in the gastric pouch of an anemic dog. A high percentage of the iron was absorbed and appeared in the circulation. As a matter of fact, the absorption of iron from the isolated pouch was as great as would have been expected from the entire enteric canal of the animal.

Studies of the secretion of the radioactive substances by the stomach have not been so extensive or so carefully controlled as studies of absorption. Brunschwig, Schmitz and Slottin[4] detected radioactive chlorides in the gastric secretion of stomach pouches within a few seconds after the labeled material was injected intravenously. They attempted to demonstrate the presence of a specific inhibitor of gastric acid secretion in the alcoholic extracts of gastric juice from a patient with pernicious anemia. Although the intravenous injection of this extract prevented secretion of chloride ions by the stomach for a period of forty minutes, there was extreme inhibition of all gastric secretion. Since it is well known that many adverse conditions — for example, the intravenous injection of foreign proteins — almost completely arrest gastric secretion, it does not seem reasonable to conclude on the basis of these experiments that the extract from achlorhydric gastric juice has a specific inhibiting effect on the secretion of chloride ions.

Radioactive chloride appeared rapidly in the gastric secretion of 5 patients with achlorhydria, but no definite evidence as to the acidity of the secretion was presented. Brunschwig, Schmitz and Slottin concluded that chloride ions could pass readily into the gastric juice independent of free acid, and that free-acid formation by the gastric mucosa is not dependent on the availability of chloride ions. Although the data presented do not justify these conclusions, the findings are sufficiently suggestive to merit repetition and extension of this type of experiment.

Thyroid Gland

Radioactive iodine has afforded a means of determining the exact role of iodine in the complex metabolism of the thyroid gland, and in addition has served as a tool for studying the effects of various hormones on this gland. It also offers considerable promise as an effective nonsurgical form of therapy for hyperthyroidism.

The remarkable ability of the thyroid gland to accumulate iodine has been clearly shown by several investigators.[5–7] In contrast to other tissues in the body, the thyroid gland rapidly removes iodine from the blood stream, building up the total concentration of the material in the gland tissue to levels five to ten thousand times greater than those existing in the blood. Other body tissues take up iodine in amounts accounted for by simple diffusion, rapidly losing the element as soon as the blood level falls. There is a definite saturation level for iodine in thyroid tissue, however, and when this concentration is exceeded, further iodine can enter the gland only by diffusion. This excess iodine is rapidly lost as soon as the concentration of iodine in the blood stream decreases. Leblond and Süe[8] found that 10 mg. of iodine per 100 gm. of fresh tissue was adequate to saturate the thyroid glands of rats, whereas the similar value for guinea pigs was 20 mg. They also believed that these animals utilized this amount of iodine every three days. If similar amounts of iodine should be required by the human gland, the daily requirement would be much greater than is indicated by present estimates.

The thyroid gland shows marked affinity for the other halogens as well as for iodine, since thyroid tissue selectively retains bromine[9] and the newly discovered halogen, eka-iodine or element 85.[10] As a matter of fact, one of the procedures employed for the identification of this newly discovered element was the demonstration of its localization in the thyroid gland in a manner similar to that of the known halogen, iodine. The importance of this localization from the standpoint of medicine is evident when it is pointed out that the new element localizes readily in hyperplastic thyroid tissue and that the radiations that it gives off are extremely powerful alpha particles. These particles produce a tissue ionization (an index of the degree of tissue destructiveness) more than two hundred times greater than the ionization produced by the beta radiation of radioactive iodine. It appears not unlikely that this element will prove valuable in the treatment of Graves's disease.[10]

Once radioactive iodine has reached the thyroid gland, it is rapidly converted into diiodotyrosine and thyroxine, as much as 70 per cent of the total thyroid radioactive iodine having been found as diiodotyrosine and 22 per cent as thyroxine four hours after the material was fed to rats.[11] The ability of thyroid tissue to perform this conversion is dependent on the integrity of the glandular structure as well as on enzyme systems, for although slices of thyroid tissue rapidly converted radioactive iodine to diiodotyrosine and thyroxine in vitro, mincing of the tissue greatly reduced the rate and extent of this conversion, while homogenization completely destroyed the ability of the tissue to form thyroglobulins.[12] Mann, Leblond and Warren[13] have shown that although inorganic iodine exists as such in the normal noniodized thyroid gland, it is not the major precursor of either diiodotyrosine or thyroxine. This finding indicates that the conversion of injected radioactive iodine to diiodotyrosine takes place at the level of the thyroid cell membrane and suggests that diiodotyrosine is the natural precursor of thyroxine. From data on the relative rates of uptake of radioactive iodine as diiodotyrosine and thyroxine, these investigators estimated that in the dog 1.55 per cent of the thyroxine content of the thyroid gland is formed each hour.

Hertz and Roberts[14] used radioactive iodine as an indicator to study the effect of thyrotropic hormone on thyroid physiology. They induced hyperthyroidism in rabbits by administering anterior-pituitary thyrotropic hormone. Radioactive iodine was then injected intravenously and the gland was subsequently assayed for its content of radioactivity. The uptake of radioactive iodine was correlated with the size of the gland, the height of the acinar cells and the basal metabolic rate of the animals. Although all these factors varied in the same direction, the ability of the cells to assimilate iodine did not always parallel the other functions. The basal metabolic rate, the cell height and the size of the gland showed initial rises in response to hormonal stimulation, reached a maximum, and subsequently declined. The ability to concentrate iodine showed a slight lag. The rate of decline was accelerated by the therapeutic administration of iodine, and the cell height, basal metabolic rate and ability to assimilate radioactive iodine fell below normal. When iodine was not administered therapeutically, a functional exhaustion of the gland developed: the cells showed involutional changes, the basal metabolic rate dropped below normal, and the size of the gland decreased markedly. In spite of these changes, the rate of iodine collection was still greater than normal.

These excellently planned and executed experiments clearly demonstrate that the results of the administration of thyrotropic hormone may be re-

garded as an initial stimulation followed by involution if iodine is administered, or by an eventual functional depression after prolonged hormonal stimulation. These data lend strong support to the concept that the thyroid gland shows a varying ability to collect iodine in various states of stimulation, with higher thresholds corresponding to the greater degrees of stimulation, and decreasing thresholds indicating conditions of involution or functional depression.

Other observations[8] on the effect of thyrotropic hormone showed that the increased uptake of iodine by the hyperplastic thyroid tissue was due in some extent to a relative increase in the number of cells per unit of thyroid mass (which occurred because of a decrease in the amount of colloid in the acini). The increased iodine uptake was explained to an even greater degree, however, by an actual increase in the efficiency or activity of the cells. Overstimulation of the gland with massive doses of hormone decreased its capacity for iodine utilization, presumably because the excessive rate of growth (indicated by numerous mitoses) inhibited the functional capacity of the cells.

Radioactive iodine has been used clinically to determine the rate of assimilation of iodine by the thyroid gland. In general, the human gland was found to behave in a fashion similar to that already described in experimental animals. The rate of uptake and the total amount of iodine assimilated depended primarily on the gland's state of functional activity as indicated by the basal metabolic rate.[15–17] These findings suggest the possible therapeutic application of radioactive iodine to hyperthyroidism, a subject that will be considered subsequently.

Placenta

Except for the fairly obvious fact that the fetus receives its nutrition from the maternal circulation through the placenta, remarkably little is known about the transfer of substances across it. Does the placenta act as an inert membrane or filter between the maternal and fetal circulations; or does it modify the transmission of substances by contributing energy to the process, thus acting as a secretory organ? Does the permeability of the placenta vary with the period of gestation? Is variation in placental transfer related to morphologic change in the placenta, to variations in its size or to variations in the growth rate of the fetus?

In an attempt to answer these and other questions, Flexner and Gellhorn[18, 19] studied the transfer of radioactive sodium and heavy water across the placentas of several species of animal during the last half of gestation. These substances were used as indicators of placental transfer because they are essential to animal growth and metabolism and because their behavior in the body is not complex. In these investigations, heavy water or radioactive sodium in the form of sodium chloride was injected intravenously into the mother. The fetuses were removed by abdominal hysterotomy an hour after the injection, at which time the fetal and placental weights were observed. Finally, the concentrations of the heavy water and of the radioactive sodium in the maternal blood plasma and in the ashed remains of the fetus were determined. Equilibrium of distribution of water between the maternal circulation and the fetus was established after thirty minutes, although equilibrium between maternal intravascular and extravascular fluids was reached in seven minutes. Similar values for distribution of sodium were four or five hours between mother and fetus and only five to thirty minutes between maternal intravascular and extravascular fluids. These findings indicate that the placental transfer is a much more complex process, and a considerably slower one, than simple exchange across a vascular epithelium. The marked difference in rate of transfer between water and sodium has been accounted for by assuming a differential permeability of the placenta for water and for sodium.

By correlating the rate of transfer of sodium per gram of placenta with the stage of gestation, it was found that the ability of the placenta to transfer sodium increased greatly during the course of gestation, by as much as sixty-seven times in the goat's placenta during the last half of gestation. This increase was associated with a decrease in the number of cellular layers of the chorionic villi and with a thinning of the remaining cells. A drop in transfer rate occurred just before term, and was associated with thrombosis of the maternal vessels and infarction of the placenta.

The placental transfer rate varied markedly with the animal species, so that it was possible to correlate this variation with the morphologic type of placenta characteristic of the species. The greater the number of tissue layers in the placenta, the lower was the unit transfer rate. For example, the unit transfer rate of the rat's placenta with three tissue layers was three hundred and twenty times greater than that of the sow's with six tissue layers.

The rate of transfer of sodium to the fetus was directly dependent on the relative growth rate of the latter. When the unit weight of the fetus was reproducing itself rapidly during the early stages of gestation, the transfer rate was high. During the later stages of gestation, when the relative growth

of the fetus was not so great, the transfer rate was correspondingly low.

These findings allow the postulation of a fundamental principle that appears to underlie all placenta transfer, namely, the rate of supply of a substance to a unit weight of fetus parallels the rate at which that unit weight of fetus is reproducing itself. It seems quite probable that any marked variation from this rate of placental transfer would have disastrous results on the fetus, and conceivably on the mother as well.

The transfer of water and sodium to and from the amniotic fluid was studied by the same technics as those employed in the placental investigation.[20] Contrary to the generally accepted belief that the amniotic fluid is relatively stagnant, the findings indicated that a volume of water equivalent to the total volume of amniotic fluid flows into and out of the amnion about once an hour in the early stages of gestation, and about once each forty minutes during the later stages. Although no information was obtained concerning the principal site of formation of the amniotic fluid, the rapidity of this exchange makes it appear highly improbable that fetal urine contributes materially to its formation. The difference in rates of transfer of sodium and water across the placenta was also observed in their transfer into the amniotic fluid, water being replaced about fifty times more rapidly than sodium.

Considerable speculation has arisen regarding the method by which iron is transferred to the fetus from the maternal body. The most commonly accepted hypothesis is that maternal erythrocytes are broken down in the placenta and that iron is freed from hemoglobin combination, transported across the placenta by macrophages, and subsequently released into the fetal system. The investigations of Pommerenke and his associates[21] cast serious doubt on the necessity for assuming such a complex mechanism, since they were able to show transportation of demonstrable quantities of radioactive iron to the fetal plasma within forty minutes after the mother had ingested a single dose of radioactive iron. The rapidity of such transfer indicates that the blood plasma is probably the means of transport of iron to the fetus, and that iron may pass from maternal to fetal plasma across placental membranes by a process of diffusion. In human fetuses obtained from therapeutic abortions performed on mothers who had ingested radioactive iron prior to delivery, the greatest portion of radioactive iron was transferred to the fetus during the latter months of pregnancy. This iron was rapidly incorporated in fetal erythrocytes, although appreciable amounts could be demonstrated in the fetal liver.

Phosphorus is apparently transferred across the placenta mainly as the inorganic phosphate, since large quantities of phosphate rapidly appear in the fetus when inorganic sodium phosphate is injected, but only minimal quantities can be detected in fetal tissues after injection of the mother with radioactively labeled phospholipid.[22]

(To be concluded)

References

1. Cope, O., Cohn, W. E., and Brenizer, Jr., A. G. Gastric secretion: absorption of radioactive sodium from pouches of the body and antrum of stomach of dog. *J. Clin. Investigation* 22:103-110, 1943.
2. Cope, O., Blatt, H., and Ball, M. R. Gastric secretion: absorption of heavy water from pouches of body and antrum of stomach of dog. *J. Clin. Investigation* 22:111-115, 1943.
3. Hahn, P. F., and Whipple, G. H. Use of radioactive iron in study of problems of iron metabolism and experimental anemia. *J. Appl. Physics* 12:314, 1941.
4. Brunschwig, A., Schmitz, R. L., and Slottin, L. Secretion of chlorine ions in achlorhydric gastric juice: observations by means of radioactive chlorine. *Am. J. Digest. Dis.* 8:171-173, 1941.
5. Hertz, S., Roberts, A., Means, J. H., and Evans, R. D. Radioactive iodine as indicator in thyroid physiology: iodine collection by normal and hyperplastic thyroids in rabbits. *Am. J. Physiol.* 128:565-576, 1940.
6. Ariel, I., Bale, W. F., Downing, V., Hodge, H. C., Mann, W., Van Voorhis, S., Warren, S. L., and Wilson, H. J. Distribution of radioactive isotopes of iodine in normal rabbits. *Am. J. Physiol.* 132:346-350, 1941.
7. Perlman, I., Chaikoff, I. L., and Morton, M. E. Radioactive iodine as indicator of metabolism of iodine: turnover of iodine in tissues of normal animal, with particular reference to thyroid. *J. Biol. Chem.* 139:433-448, 1941.
8. Leblond, C. P., and Sūe, P. Iodine fixation in thyroid as influenced by hypophysis and other factors. *Am. J. Physiol.* 134:549-561, 1941.
9. Perlman, I., Morton, M. E., and Chaikoff, I. L. Selective uptake of bromine by thyroid gland with radioactive bromine as indicator. *Am. J. Physiol.* 134:107-113, 1941.
10. Hamilton, J. G., and Soley, M. H. Comparison of metabolism of iodine and of element 85 (eka-iodine). *Proc. Nat. Acad. Sc.* 26:483-489, 1940.
11. Perlman, I., Morton, M. E., and Chaikoff, I. L. Radioactive iodine as indicator of metabolism of iodine: rates of formation of thyroxine and diiodotyrosine by intact normal thyroid gland. *J. Biol. Chem.* 139:449-456, 1941.
12. Morton, M. E., and Chaikoff, I. L. In vitro formation of thyroxine and diiodotyrosine by thyroid tissue. *J. Biol. Chem.* 144:565, 1942.
13. Mann, W., Leblond, C., and Warren, S. L. Iodine metabolism of thyroid gland. *J. Biol. Chem.* 142:905-912, 1942.
14. Hertz, S., and Roberts, A. Radioactive iodine as indicator in thyroid physiology. *Endocrinology* 29:82-88, 1941.
15. Hamilton, J. G., and Soley, M. H. Studies in iodine metabolism of thyroid gland in situ by use of radio-iodine in normal subjects and in patients with various types of goiter. *Am. J. Physiol.* 131:135-143, 1940.
16. Hertz, S., Roberts, A., and Salter, W. T. Radioactive iodine as indicator in thyroid physiology: metabolism of iodine in Graves' disease. *J. Clin. Investigation* 21:25-29, 1942.
17. Hertz, S., and Roberts, A. Radioactive iodine as indicator in thyroid physiology: use of radioactive iodine in differential diagnosis of 2 types of Graves' disease. *J. Clin. Investigation* 21:31, 1942.
18. Flexner, L. B., and Gellhorn, A. Comparative physiology of placental transfer. *Am. J. Obst. & Gynec.* 43:965-974, 1942.
19. Gellhorn, A., and Flexner, L. B. Transfer of water across placenta of guinea pig. *Am. J. Physiol.* 136:750-756, 1942.
20. Flexner, L. B., and Gellhorn, A. Transfer of water and sodium to amniotic fluid of guinea pig. *Am. J. Physiol.* 136:757-761, 1942.
21. Pommerenke, W. T., Hahn, P. F., Bale, W. F., and Balfour, W. M. Transmission of radioactive iron to human fetus. *Am. J. Physiol.* 137:164-170, 1942.
22. Nielson, P. E. Study with radioactive phosphorus of permeability of rat placenta to phospholipid. *Am. J. Physiol.* 135:670-675, 1942.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Ante-Mortem and Post-Mortem Records as Used in Weekly Clinicopathological Exercises

founded by richard c. cabot

Tracy B. Mallory, M.D., *Editor*

CASE 29141

Presentation of Case

A sixty-nine-year-old housewife entered the hospital because of epigastric pain and persistent vomiting.

Approximately twenty years before admission she suffered with typhoid fever, from which she apparently made a complete recovery. However, ever since then she had been bothered by attacks of biliousness, often following fatty foods, that usually occurred two to four times a year and lasted approximately one day. These attacks were characterized by dull pain in the midepigastrium and right upper quadrant, which occasionally radiated to the precordium and along the medial aspect of the left upper arm. During some attacks she vomited almost continuously for twenty-four hours. The vomitus consisted of recently ingested food and bile-stained fluid. She had never had chills, fever, dyspnea, palpitation, jaundice, tarry or acholic stools or dark urine. Ten years before entry x-ray studies at a community hospital failed to demonstrate any abnormality of the gall bladder or stomach.

Four days before admission, following a meal that included bacon, she developed a severe, steady midepigastric pain that radiated to the precordium and left arm. Several hours later she vomited greenish material. Vomiting and pain persisted and on the day of entry the vomitus was ejected with considerable force. Since the onset of this illness she had not moved her bowels. An enema failed to relieve her. There was no dysuria, hematuria or nocturia.

The family history was noncontributory. A fibroid uterus was removed twenty-five years before entry. The patient had suffered with rheumatoid arthritis of both knees for two years.

Physical examination disclosed a well-preserved woman who was obviously quite uncomfortable. The skin was loose and quite dry. Examination of the lungs was negative. The apex of the heart was percussed 9 cm. to the left of the midsternal line in the sixth intercostal space. At times the apical rhythm seemed slightly irregular and suggested a gallop rhythm. The abdomen was soft; no masses were felt, and no tenderness was elicited. Peristaltic sounds were absent. Pelvic and rectal examinations were negative.

The blood pressure was 110 systolic, 76 diastolic. The temperature was 97°F., but eight hours later rose to 100.2°. The pulse was 90, and the respirations 20.

Examination of the blood revealed a red-cell count of 5,630,000 and a white-cell count of 30,400 with 90 per cent polymorphonuclear leukocytes. When repeated ten hours later the white-cell count was 24,600. The urine sediment contained 1 or 2 white cells and occasional granular and hyaline casts per high-power field. A flat x-ray film of the abdomen showed a loop of dilated small intestine in the left midabdomen. One soft-tissue mass that lay in close contact with the lower pole of the right kidney measured 10 cm. in length and 6.5 cm. in width. There was another, poorly defined, soft-tissue mass arising from the pelvis that was somewhat irregular in outline.

Approximately fifteen hours after admission an exploratory laparotomy was performed under local anesthesia. The abdomen was opened through a left paramedian rectus-splitting incision. Loops of dilated jejunum were immediately encountered and these were followed to a 7.5-cm. knuckle of bowel that was caught under a firm fibrous band in the left lower quadrant. After the band was divided, the bowel regained color and peristaltic waves crossed the damaged segment of bowel. No resection was performed. The patient seemed quite satisfactory after return to the ward, but twenty-four hours later she became incontinent of urine and feces and began to vomit almost constantly, in spite of gastric suction. Attempts to pass a Miller–Abbott tube were unsuccessful. Eight hours later both legs seemed cold. No femoral, popliteal, dorsalis pedis or posterior tibial arterial pulsations were felt in either leg, and the legs were mottled as high as the upper thigh. Examination of the heart and lungs was unchanged. Peristaltic sounds were audible. Heparinization was begun, and one ampule of Spasmalgin was given every six hours.

The next day the patient was drowsy but could be aroused. The status of the legs remained the same. The urinary output was fairly good. Peristaltic sounds were absent. She was given a 500-cc. blood transfusion. The following day, the third postoperative day, she became comatose, passed bloody stools and died. The legs remained cold and bloodless, and the upper thighs were livid.

Differential Diagnosis

Dr. E. Parker Hayden: This is an interesting history with many possibilities. Let us go back

to the beginning. The patient was known to have had typhoid fever, and later had some attacks which, according to the description, sound like gall-bladder attacks. On the other hand the pain did radiate to the middle aspect of the left arm, at times, which suggests heart attacks. X-ray studies of the gall bladder and stomach in an outlying hospital were negative, but we do not know whether a Graham test was included or how reliable the x-ray reports were. She vomited continuously during these attacks, for twenty-four hours at a time.

The recent attack started four days before entry and followed a meal of high fat content. This may have been another gall-bladder attack similar to those the patient had had in the past, since there was the same type of radiation. On the other hand we do know, from the report of the operation, that definite obstruction was found in the small bowel, which was evidently considered to have been due to an internal hernia. With that knowledge it seems reasonable to suppose that the recent attack was due to intestinal obstruction even though the description of this attack is similar to those that occurred over a period of years.

On entrance to the hospital the patient was dehydrated. The heart was apparently not normal — just how abnormal, it is difficult to be sure from the description. The fact that peristalsis was absent makes one hesitate to interpret this as an attack of mechanical small-bowel obstruction, despite a description of what appears to have been a herniation, with visualization of the loop in an effort to see whether it was likely to survive or should be resected. These two findings do not go well together.

The uterus had been taken out sometime before. We have x-ray evidence of two soft-tissue masses, one below the right kidney and one arising from the pelvis. It does not say whether the latter lay more on one side than on the other. The woman may have had two ovarian cysts that developed after hysterectomy and had nothing to do with the present story. On the other hand, the shadows may represent a tumor that did have something to do with the present story. I am rather inclined to discount this finding, however. Apparently there was some degree of polycythemia, which brings up the possibility that she had an associated stomach ulcer — there being a fairly high incidence of gastric ulcers in polycythemia. The white-cell count was 30,000, out of proportion to the temperature, which, according to the history, never went above 100.2°F. The white-cell count dropped the following day to 24,600.

There seems to be little doubt that there was obstruction in the abdomen and that it was definitely relieved by operation. Things were going nicely so far as the operation was concerned. Whatever killed this woman seems to have developed postoperatively. One naturally thinks of the possibility of her having developed a mesenteric thrombosis, inasmuch as there was diminished circulation in that loop of bowel at operation, and because of the red-cell count which seems adequate to have supported a diagnosis of mild polycythemia in a woman. Against the possibility of mesenteric thrombosis is the fact that on the day before she died she had audible peristalsis, although she could have had a thrombosis that had not progressed to the point of eliminating peristalsis. The abdomen was silent on the last day. Judging from the fact that she had received heparin she was considered to have thrombosis somewhere, but we know that she had in her legs either a rapidly progressive thrombosis or a large embolus at the bifurcation of the iliac arteries.

I find it extremely difficult to make a diagnosis on this history, but it seems to me as though the woman probably did not have a mesenteric thrombosis, but that her death was associated with an extensive disturbance in circulation to both extremities, with nothing acute within the abdomen. What the thrombosis was due to is difficult to say; she probably had some degree of polycythemia and developed thrombosis or embolism on the lower extremities. If it was an embolus it may have come from the heart or from some more obscure area. I really am quite at sea on the case, and doubt if I can make an intelligent diagnosis.

Dr. George W. Holmes: The shadows that I am pointing out represent the dilated small bowel. The loops are not only dilated but also show increased peristaltic activity. That suggests obstruction and is not the appearance seen in paralytic ileus.

Dr. Leland S. McKittrick: What do you mean by that?

Dr. Holmes: It means that a considerable amount of peristaltic activity is going on in the small bowel.

Dr. McKittrick: Do the haustral-like formations suggest it?

Dr. Holmes: They are not haustral formations, of course; but they do look like them.

Dr. McKittrick: As I look at it, this looks almost like large bowel.

Dr. Holmes: That is so.

Another interesting thing is that there is no gas except in this loop.

Dr. Tracy B. Mallory: Can you be certain that it is small intestine, Dr. Holmes?

Dr. Holmes: Yes; I am reasonably certain. Of course one can make a mistake.

DR. MCKITTRICK: May I ask one more question? Are you certain enough so that you would advise a surgeon to do a laparotomy?

DR. HOLMES: Does it make any great difference whether the small or large bowel was obstructed?

DR. MCKITTRICK: It might make quite a lot of difference. If there was a question in the mind of the radiologist, the point that I want to bring out is, Would there have been any harm in putting barium into the rectum to make sure of the lesion?

DR. HOLMES: There would have been no harm. If it was large bowel, it could have been a volvulus; if small bowel, which I think it was, it was not necessarily a volvulus. The reason for a volvulus in the large bowel is that there was no gas anywhere else. If it was a loop of small bowel, I do not know how to explain the absence of gas in the rest of the bowel. The liver shadow is not increased in size, and I do not see the gall bladder or any evidence of gallstones.

I think that I shall have to admit that I do not see the soft-tissue shadows that are described. They may be there.

DR. MALLORY: In almost every history of this sort there is something that one cannot bring into the picture, but I think Dr. Hayden passed over the frankly bloody stool with slight comment.

DR. HAYDEN: Yes; I temporarily forgot about that. Of course, that did alter the picture just before the patient died.

DR. MCKITTRICK: Where do you think the thrombosis was?

DR. HAYDEN: Not being a peripheral vascular expert, I am in doubt whether she had thrombosis or embolism.

DR. MCKITTRICK: You would be in doubt if you were a peripheral vascular expert.

DR. HAYDEN: The history does not say much about the swelling of the legs — nothing about the degree of swelling. I might draw some conclusions from the location and appearance of the swelling, but since it involved both legs, I assume the vascular obstruction must have been around the bifurcation of the iliac arteries.

CLINICAL DIAGNOSIS

Occlusion of abdominal aorta, due to embolus, mural thrombus or dissecting aneurysm of aorta.

DR. HAYDEN'S DIAGNOSES

Thrombosis or embolism of iliac arteries.
Polycythemia.

ANATOMICAL DIAGNOSES

Gangrenous infarction of sigmoid (volvulus).
Hemoperitoneum, slight.
Ulceration of small bowel, postoperative.
Operative wound, fresh: lysis of adhesions about small bowel.
Operative wound, old: hysterectomy.
Arteriosclerosis, severe, aortic.
Thrombosis of abdominal aorta and both iliac arteries.

PATHOLOGICAL DISCUSSION

DR. MALLORY: The post-mortem examination showed, first, that the loop of small bowel that had been obstructed and had been returned to the abdomen as viable was still viable although distinctly discolored. There were small ulcers in the mucosa, but the bulk of the bowel wall was in good condition. On the other hand, inspection of the lower intestinal tract showed that the entire sigmoid was black and gangrenous. At the moment of examination it was not twisted upon itself. There were no thrombi in either the arteries or veins running to this loop of sigmoid so that the only explanation for this gangrene is that it was due to a volvulus. The other complicating feature, which unquestionably played a considerable role in producing death, was a thrombosis of the inferior aorta beginning just below the renal vessels and extending down the remainder of the aorta and far into both iliac arteries. The aorta was markedly sclerotic, with a great many shaggy thrombi overlying deep atheromatous ulcerations. We thought we could distinguish two ages of clot. There were many small clots adherent to the bases of the ulcers and then a much fresher and larger clot that completely occluded the aorta.

It is surprising, to me at least, how extensive ulcerative arteriosclerosis of the aorta can be at autopsy, and yet how seldom thrombi develop that are of significant size from the clinical point of view. However, I am reasonably sure this was a case in which the thrombus was locally formed from the atheromatous plaques.

The gall bladder was entirely negative despite the long history of apparent gall-bladder attacks.

DR. HOLMES: Were there any soft-tissue masses in the pelvis that could account for the shadows?

DR. MALLORY: No; unless they came from the sigmoid.

DR. HOLMES: What was the date of operation as compared with that of these films?

DR. MCKITTRICK: They were taken before operation. The dilated loops were the small bowel; I was trying to talk you out of it.

How often, Dr. Mallory, have you seen a thrombus that completely occludes the aorta? I am not referring to a thrombus which comes from higher up and causes an embolic occlusion.

DR. MALLORY: It is uncommon. I have seen it less than five times.

CASE 29142

PRESENTATION OF CASE

First admission. A forty-six-year-old housewife entered the hospital because of a persistent cough.

Approximately eight months before admission the patient developed a hacking cough and began to raise a small amount of sputum each morning that occasionally was blood tinged. There was slight dyspnea on exertion, but no cyanosis, palpitation, orthopnea, ankle edema, chest pain, fever, chills or night sweats, and she had gained 17 pounds during the six months preceding entry.

The family and past histories were noncontributory. There had been no contact with an open case of tuberculosis. A hysterectomy had been performed nine years before admission.

Physical examination disclosed a well-developed, obese, apprehensive woman who had a bothersome cough. The heart, lungs and abdomen were normal. A vaginal examination was essentially negative, and the fundus could not be felt.

The blood pressure was 130 systolic, 90 diastolic. The temperature was 98.6°F., the pulse 89, and the respirations 20.

Examination of the blood revealed a red-cell count of 4,490,000, with a hemoglobin of 13.6 gm., and a white-cell count of 11,000, with 65 per cent neutrophils, 21 per cent lymphocytes, 10 per cent monocytes, 2 per cent eosinophils and 1 per cent basophils. The urine was acid in reaction and had a specific gravity of 1.012, and the sediment contained a rare red and white cell and 3 epithelial cells per high-power field. The blood Hinton test was negative. The sedimentation rate was 2, 5 and 9 mm. after thirty, forty-five and sixty minutes respectively. No acid-fast bacilli were seen in seven sputum examinations.

A chest roentgenogram disclosed a rounded, 4-cm., homogeneous area of increased density in the medial portion of the right infraclavicular area. There was no evidence of calcification or of cavity formation, and the right lung field was otherwise clear. Overlying the anterior end of the fourth left rib were two irregular areas of increased density. The remainder of the left lung field was clear. The heart and mediastinum were not remarkable, and there was no evidence of respiratory shift. Both sides of the diaphragm were smooth in outline and showed normal motion. A review of films taken prior to entry showed much the same appearance except that the nodules in the left lung field were seen more clearly and appeared to be round rather than irregular. In the flat plate of the abdomen, the kidneys appeared normal in size, shape and position; no stones were seen. Intravenous dye was promptly excreted and outlined normal urinary passages.

Bronchoscopy on the second hospital day disclosed a normal trachea. The left bronchus was not entered, but on entering the right bronchus, the floor was displaced forward by extrinsic pressure. The orifice of the upper-lobe bronchus appeared angulated as though there were outside pressure on the superior angle where this bronchus met the main stem, thus displacing the opening downward and causing the superior lip to present sharply in the main-stem lumen. There was no visible growth, and nothing from which a biopsy could be taken. Sputum was obtained for acid-fast examination. The next day a pneumothorax was started in preparation for thoracoscopy. The patient was discharged unimproved on the ninth hospital day. X-ray films of the chest taken after the pneumothorax yielded no additional findings.

Second admission (one year later). The patient was readmitted for exploratory thoracostomy. Her symptoms had continued unchanged. An x-ray film of the chest taken a month after discharge revealed that the right lower lung had re-expanded, but that there was still a considerable quantity of air surrounding the collapsed right upper lobe. The mass in the right upper lobe had not changed except that it contained a questionably small area of diminished density suggestive of beginning cavity formation. The nodules in the left midlung field were not clearly visible and were approximately 1 cm. in diameter.

Physical examination was unchanged. The temperature, pulse and respirations were normal.

An x-ray film of the chest taken on the day of admission revealed that the "mass" in the right upper lobe had slightly increased in size and was approximately 7 by 7 by 6 cm. The cavity had also increased slightly. There was an area of atelectasis in the anterior portion of the base of the right upper lobe. The two small areas in the left lung field had not changed.

An operation was performed on the seventh hospital day.

DIFFERENTIAL DIAGNOSIS

DR. HELEN PITTMAN: I assume that the operation done nine years ago was at an outside hospital; hence, we do not know about the ovaries or why the operation was done.

The laboratory findings were essentially normal. It is not stated whether sputum taken at bronchoscopy was examined for tubercle bacilli or what the report was, and I do not know why they went ahead and did a thoracoscopy.

This patient was a forty-six-year-old woman in good health. Before the time of operation, she had had, for one year and eight months, a cough productive of small amounts of sputum, which was only occasionally, not regularly or daily, blood tinged. She had had slight dyspnea on exertion, had gained weight and had had a hysterectomy nine years before, for what reason or what was removed we do not know. It is the kind of problem that we are faced with frequently and it is a difficult one because we do not have much to go on. With each case of chest tumor we have to go through rather stereotyped processes of reasoning. First of all, we think of the possible diagnoses and the appropriate diagnostic procedures. If that does not give the answer we must come to the decision whether or not exploration should be done.

The most probable diagnosis is malignant tumor, either primary or secondary. If primary, we think first of primary carcinoma of the bronchus. There was some blood, but it was only occasional, and we have learned to realize that the bleeding which leads us to suspect carcinoma of the bronchus is the daily ooze, not the occasional blood streak. This patient had pressure on a bronchus that was enough to give an irritating cough and I think we can say that this small amount of bleeding was probably secondary to the irritation that comes from pressure and was not caused by bronchial ulceration. Other primary malignant tumors are extremely rare; these include sarcoma, lymphoma, dermoid cyst and teratoma.

May we see the x-ray films?

Dr. George W. Holmes: The first two films were taken before coming to this hospital. The lesion itself is distinctly lobulated. It varies somewhat in density, and within its substance are bright areas, which I think are bronchi but may be cavities. The heart and mediastinum are not displaced. There are no eroded ribs. The process is not adherent to the pleura because it was easily displaced after giving the pneumothorax. It is in the midchest — neither in front or in back, nor in the upper or the lower portion. In the opposite lung field there is a small irregular shadow that is visible in most of the plates and does not change appreciably in size during this period of time.

Certainly the change in the size of the lesion itself was not rapid. One must also consider the possibility that a bronchus was plugged and that this shadow was due to atelectatic lung around a mass rather than to the actual mass. There was no fluid in the pleural space.

Dr. Pittman: This does not look to me like metastatic disease in the chest, but we have to think of that and it is quite obvious that they were thinking of it when the patient was worked up on the first admission. There were two possible sources: the unknown pelvic situation nine years before, and the commoner one, hypernephroma which they obviously were considering. This to me is not at all the picture of what one usually sees with metastases from a hypernephroma. But when the flat plate and the pyelograms were made they probably had that in mind, and certainly it was the proper thing to do.

The next thing to consider in a chest of this sort is chronic infection, and the two infections that we see most commonly are tuberculosis and lung abscess. The history does not suggest infection. The patient had gained weight, had had fever, and had no anemia or leukocytosis — the white-cell count of 11,000 with 65 per cent neutrophils is essentially normal. She also had a low normal sedimentation rate. Repeated sputum examinations were negative for tubercle bacilli. We do not know whether acid-fast stains were done on material obtained through the bronchoscope. This is one of the cases in which tests with a series of dilutions of tuberculin might have been extremely important. In the presence of this lesion a negative test with a 1:1000 dilution of tuberculin would have enabled one to have ruled out tuberculosis.

Going back to the primary bronchial tumors, I must say that the sputum does not suggest such a tumor or ulceration into the bronchus, and the bronchoscopic examination was negative for a lesion of the bronchial wall. It did, however, show extrinsic pressure, so I think we can fairly safely reject from our minds a primary carcinoma of the bronchus.

Then one must consider benign tumors. This was an essentially asymptomatic mass, which did not affect the patient's health, and on bronchoscopic examination only revealed evidence of extrinsic pressure. Intrathoracic goiter and dermoid cyst are possibilities, but I feel perfectly sure that both can be discarded at this time.

On the patient's first admission she was put through the routine diagnostic procedures of x-ray study, blood work, bronchoscopy and pneumothorax. The last was done to learn whether it caused the lung to fall away from the pleura and hence made the lesion more clearly visible, and at the same time to show up the parietal pleural surface to see if it was smooth or showed nodules. At the time of discharge on the first admission the more serious diseases, for which one should in-

terfere, had been ruled out, and given a patient who was not sick it was reasonable to keep her under observation — to let her go home and to see how things went along.

That is apparently what was done. The x-ray taken one month after discharge shows that for at least a month she kept in contact; then she came back a year after the first admission still, we gather, in good health, with no significant change in the symptoms and with no fever. There are no reports of blood, urine and sputum examinations at that time, but I assume that they were still negative. Then comes the situation that must be frequently faced with these tumors. All the routine and reasonable diagnostic procedures have been carried out; the patient is in good health, but there is an increasing lesion. Is one justified in allowing it to ride any longer or must one explore and find out what is at the base of it? I think that is the really important point in this case. One can guess all day long about the diagnosis. All leads have been quite valueless, and while there is still time to do something, one should resort to exploration for purpose of diagnosis. I think that was probably the situation in this case.

One should have a preoperative diagnosis for a working basis. There are few clues to throw weight on any of the things that I have discussed. There is little evidence for infection, and a good deal of evidence against it. I am going to make a preoperative diagnosis of tuberculosis; possibly the mass was a tuberculoma or a large tubercle.

Dr. Tracy B. Mallory: The preoperative diagnosis was tuberculoma, Dr. Pittman.

Dr. Richard Sweet: This was one of the most amazing cases we have had in a long time and I welcome the opportunity to find out what the pathologists found, because I have not heard. Because of the exigencies of the war, the patient had a complete change of doctors during a period of one and a half years. The surgeon who first saw her went to war, then the medical man went; finally the one who did the bronchoscopy entered the armed services. It was my impression that we did another bronchoscopy at the time of the second admission, but perhaps not. At any rate, the case was presented to me by her new physician for a decision whether we should do, as Dr. Pittman has said, an exploratory operation.

I was impressed by a number of clinical facts regarding this patient. First of all, after a year and a half she was in remarkably good condition and had no fever. This seemed to indicate that she did not have a wasting disease. From that standpoint, as you recall, Dr. Holmes mentioned a lesion in the left lung field, and it is my impression that the surgeon who first reviewed her case believed that because of this lesion and the probability that she had tuberculosis it would be unwise to operate for fear of a flare-up on the left side. Since that time more lobectomies have been done for tuberculosis and perhaps we had more courage at the second admission than we had at the first. I was never convinced of the diagnosis of tuberculosis, although Dr. Mallory has said that the preoperative diagnosis was tuberculosis. My diagnosis was tuberculosis or cancer. I did not see how one could tell which it was. The reason I leaned a little toward cancer was that she had a persistently bloody sputum. It is unfortunate that Dr. Pittman was not given that information in the record. The patient was worried about herself because of this blood-tinged sputum almost every day. That to me usually means carcinoma. On the other hand the history was a long one. Patients with carcinoma of the lung, even of only a few months' duration, are usually in poor physical condition, but this woman was in good shape. So although we really had no accurate information concerning the diagnosis, I leaned toward carcinoma, as did the medical man who had her in charge, as well as some of the others who saw her, including one physician whose knowledge of tuberculosis is extensive.

At operation the condition was still puzzling. The lesion involved the upper lobe. It was not adherent. As soon as air was introduced into the chest it fell away from the chest wall. It had a round contour like that of a swollen liver. The surface was depressed, and there was a milky film over its surface. As I felt of it, it had a rubbery consistence; it was not hard and firm like a carcinoma. I could not tell what it was. There were no enlarged lymph nodes at the hilum, which is consistent with the diagnosis of tuberculosis. In the majority of carcinoma cases, on the other hand, the nodes are involved. Removal of the lobe was easy. Her convalescence was as smooth and uneventful as any I have ever seen, and that to me is circumstantial evidence in favor of the diagnosis of carcinoma.

Dr. Mallory: Do you care to say any more, Dr. Pittman?

Dr. Pittman: I should feel, as Dr. Sweet did, that if the patient was having daily bleeding one would have to consider carcinoma much more seriously than I considered it, although it certainly is unusual to have a bronchoscopy merely showing evidence of extrinsic pressure.

Dr. Sweet: I do not understand the bronchoscopic report. They say there was evidence of pressure on the trachea or bronchi, but at the time of operation there was none whatever.

DR. MALLORY: Dr. Robbins, have you any comments?

DR. LAWRENCE ROBBINS: No; my diagnosis was tuberculoma from the way the lesion had progressed.

DR. HOLMES: The x-ray evidence is in favor of tuberculoma.

CLINICAL DIAGNOSIS

Carcinoma of lung?
Tuberculoma?

DR. PITTMAN'S DIAGNOSIS

Tuberculoma.

ANATOMICAL DIAGNOSIS

Metastatic papillary cystadenocarcinoma of ovary.

PATHOLOGICAL DISCUSSION

DR. MALLORY: Dr. Castleman, who schedules these conferences, sometimes plays a trick on me. When we have a particularly difficult specimen over which I delay about committing myself, he occasionally puts it on for clinicopathological conference without warning and I have to make up my mind. I think that is the reason this case was scheduled.

I am not a bit sure what the diagnosis is. About four fifths of the right upper lobe was replaced by a rather firm, but not extremely hard, tumor. Grossly it looked like tumor and certainly was not tuberculosis, but it was peculiar in several respects. There were four small cystic cavities within the solid tumor that did not seem to be bronchi, and each of them contained mucoid material. They seemed to be part of the tumor.

The microscopic sections present a very unusual appearance. The architecture of the lung is perfectly preserved. The bronchi are lined with perfectly normal ciliated epithelium, and the great majority of the alveoli are lined with extremely high columnar epithelium that is obviously secreting mucus. This epithelium projects into the lumens of the alveoli in papillary masses, and there is no destruction of the alveolar walls that can be clearly outlined by elastic-tissue stains. The appearance of the cells, the papillary character and the mucoid secretion are all similar to the findings in papillary adenocarcinoma of the ovary. This woman had had a hysterectomy nine years previously and we have not yet succeeded in checking up on the findings of that operation. It is conceivable that this represents metastasis from an ovarian tumor. On the other hand this would be an extraordinary course for a malignant ovarian cyst. They almost always extend first through the wall of the cyst to the peritoneum, then produce widespread peritoneal implantations followed by ascites, and distant metastases are quite uncommon. Metastasis from a papillary pseudomucinous ovarian cyst must remain a possibility. It is still a question whether the masses in the other lung were likewise metastatic, and it is difficult to explain why one should grow and two others remain the same size.

The other possibility is that this was a primary tumor of the lung, and in favor of that I have seen just one other case which to my recollection is exactly similar in growth and histologic appearance. That case occurred in a man so that ovarian cyst was out of the question; moreover we had an autopsy and found no tumor outside the lung. However, the thyroid, a frequent source of papillary adenocarcinoma, was not examined. If the tumor was primary it seems to be essentially a carcinoma of the alveoli with no demonstrable connection with any bronchus, and there is so little evidence that alveolar epithelium actually exists that one hesitates to make such a diagnosis. I have to leave the question open.

DR. SWEET: From the clinical picture, I should accept the diagnosis of primary tumor of the lung much more readily than anything else. I have never seen any other case exactly like this one.

DR. MALLORY: It is very unusual for a tumor to invade an entire lobe of the lung, growing simply along the surfaces of the alveoli and producing no destruction of the lung tissue, but I have occasionally seen similar pictures before.

DR. HOLMES: What do you think of the lesions in the other lung? Were they just a red herring?

DR. SWEET: They have not changed over a period of observation. Everyone has been looking at them and expecting them to clear up. Those who vote for tuberculosis use these lesions as evidence for tuberculosis. My opinion was purely clinical and was not based on the x-ray findings.

Addendum. Between presentation of this case at conference and publication it was discovered that a papillary pseudomucinous cyst of the ovary was removed at the time of the hysterectomy. Dr. Arthur T. Hertig, of the Free Hospital for Women, Brookline, kindly loaned me a microscopic section for comparison. The character of the two tumors is identical, so I believe the major pulmonary lesion was unquestionably metastatic, and my guess is that the smaller lesions in the opposite lung must be also.—Tracy B. Mallory.

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ABSENTEEISM IN INDUSTRY

In the beehive the individual is recognized either as a worker or a drone, and is promptly and appropriately dealt with on that basis. Thus the hive is not plagued by absenteeism in any form. Fortunately or unfortunately, human beings have not evolved the social insight of the bees, and they must consequently cope with this distressing quirk of human behavior whenever and wherever groups of persons gather and attempt to correlate their efforts. Absenteeism has long been recognized as a phenomenon of school life, college life and adult life. One would like to believe that it is progressively outgrown and appears less frequently in adolescence and maturity, but such is probably not the case.

One might like to assume that human beings could be separated, like the bees, into groups that could be defined and labeled as workers or drones. Although there are undoubtedly many human beings in both these categories, there also are many who are subtly placed in between such groups. As one visualizes the various shades of people represented among his acquaintances he discerns certain behavioristic patterns that would bear heavily on the incidence of absenteeism in their industrial employment. There are the hard workers, those who — sick or sore — report for duty punctually, and, so long as they can stand on their feet, deliver their full measure of effort. Next there are those who absent themselves only when they are definitely sick and who return at the earliest possible moment to steady employment — the "conscientious" people. Next are those who are "spleeny," who make the most of whatever illness they have and manage to make a good deal of some illnesses that they do not have. Then come the willful absentees — those who cannot recognize either our national perils or our national opportunities as their own. They may be motivated by excessive selfishness or deficient intellect, and they rationalize their absenteeism by all sorts of sophistries. For example, one is quoted as saying, "They won't give me a vacation, so I've got to take it myself." Many are undisciplined, unaccustomed and frankly unsuited to the work they are attempting to accomplish in industry, including those who are laboring in factories for the first time and those who are desperately trying to make themselves useful in fields to which they have not been and never will be naturally adapted. Lastly come those on whom the world has bestowed such adjectives as "lazy," "incompetent" and "inadequate" — the people who in normal times are unable to obtain or hold a job of any sort.

Because sickness is the only indisputable status with which to explain most absenteeism, the physi-

cian's association with all these factors is close and decisive. Doctors have long been called on to certify that overwrought students are nervously or otherwise ill at the moment they face a critical examination. The cutting of classes for hours and sometimes for days preceding an examination has been frequently observed in school and college. There is a sort of epidemiology to this kind of behavior, academic outbreaks of which can often be satisfactorily analyzed. Industrial absenteeism is not so readily studied or understood, however, because the basic groups concerned have fewer common denominators than have the semidisciplined student bodies. The rapid labor turnovers of today also mitigate against an understanding of the underlying mechanisms. Nevertheless, alarm is being expressed over the effect that absenteeism is already having on war production, and an effort to deal sternly with it may come at any time. When it does appear, the physician is apt to find himself in the vortex of many a little cyclone.

GOOD HUNTING

An entertaining intellectual exercise is provided if we try, occasionally, — perhaps idly, — to formulate for ourselves the real meaning and value of our culture and our civilization. That they have had, and have, real value for us is beyond question, for they have represented standards that we are apparently willing to make great sacrifices to preserve.

We were wrong, however, in assuming too readily that the environmental influences of our culture had made somatic changes in us; that our exposure to knowledge, ethics and brotherly love had made some vital change in our genes, transforming us into a morally superior race, forever and ever, amen. New species are developed, we know, as the descendants of Mendelian sports, but they do not arise because great-grandfather had a good teacher at Latin School. They come because of internal explosions, not because of concussions at the periphery of the organism.

Most interesting, in support of this thesis, is the ease with which, from clerk to clergyman, from pharmacist to farmer, we again become the killer. We thought of battle murder and sudden death as something belonging to a relatively forgotten era, at least a generation away, or to a locality geographically remote, and certainly something relished by people less refined than ourselves. Then come the threat and the blow, and the discipline of our culture is superseded by the law of the claw and the fang. We want our enemies to be killed, mercilessly and in great numbers, and we want photographic evidence of the killing, with our breakfast.

It is an amazing metamorphosis — a strange and rapid indoctrination, albeit a necessary one. A few short years ago the paths of righteousness were the paths of peace. The popgun, that youthful symbol of violence, was hidden away; the smitten yearling was instructed to turn the other downy cheek; we were on the verge of spiritual vegetarianism. And now, of a sudden, the toy cannon has come down from the attic, lead soldiers again march and countermarch across the playroom floor, while the eyes of its occupant sparkle with joy at the news of fifteen thousand Nipponese adventurers entering their own peculiar eternity beneath the waters of the Pacific. Emotionally we are again meat eaters, as we are in practice, when we can get the meat.

Our culture and our intellectual way of life have meaning and value for us, but not because they have changed our fiber or altered our capacity. It is because of the discipline of thought and action that they have given for our support, and the code of ethics that they have furnished for our guidance.

MEDICAL EPONYM

Thomsen's Disease

The Schleswig practitioner who described this symptom-complex, Asmus Julius Thomsen (1815–1896), of Kappeln, was himself a victim of the disease, which had been graphically described by Charles Bell in his book *The Nervous System*. In Thomsen's paper, "Tonische Krämpfe in willkürlich beweglichen Muskeln in Folge von ererbter psychischer Disposition (Ataxia Muscu-

laris ?) [Tonic Spasm of the Voluntary Muscles as the Result of a Hereditary Psychic Predisposition (Ataxia muscularis ?)]," which appeared in *Archiv für Psychiatrie und Nervenkrankheiten* (6:702–718, 1876), he quotes Bell's description. A portion of the translation follows:

> Certainly the most essential feature of the affection is a weakness in the influence of the will on the organs of voluntary motion, which manifests itself in all the muscles, sporadically in any one, sometimes in all of them, but chiefly in those of the extremities, especially the legs. These members are not so subject to the will as they should be, and at times give way entirely. . . . The phenomenon is frequently most strikingly apparent in the gait, which, when the tendency to these cramps is present, quite resembles that of a drunken man until the spasm relaxes. The principal exciting cause is a psychic one — the fear of the curse of making one's self ridiculous.

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

COMMITTEE ON INDUSTRIAL HEALTH

The program for the Institute on Industrial Health, to be held at the Harvard Club of Boston, on April 24, under the auspices of the Committee on Industrial Health, is as follows:

9:30 Methods Used in Establishing a Diagnosis of Industrial Poisoning. Dr. Joseph C. Aub.

10:00 The Late Effects of Craniocerebral Trauma: A consideration of the criteria necessary to evaluate the possible causes. Dr. Donald Munro.

10:30 Medical Aspects of Absenteeism in Industry. Dr. Louis R. Daniels. Discussion by Dr. Daniel L. Lynch and Dr. A. W. Reggio.

11:15 Medical Causes for Rejection in Selective Service. Lt. Colonel Lewis S. McQuade.

Neuropsychiatric Causes for Rejection in Selective Service. Dr. Harry C. Solomon.

Discussion.

12:30 Luncheon (Guest speaker: Dr. Alice Hamilton).

2:15 Present Status of Relation of Heart Disease to Industry. Dr. Paul D. White.

2:45 Epidemic Keratoconjunctivitis. Dr. Irving R. Tabershaw.

3:15 Opportunities for the Prevention and the Treatment of Diabetes in Industry. Dr. Elliott P. Joslin.

The Treatment of Trauma in Diabetic Employees. Dr. Leland S. McKittrick.

Industrial Hazards for Diabetic Employees. Dr. William A. Bishop.

4:15 The Problems of Women in Industry. Dr. Thomas L. Shipman.

Discussion.

Dwight O'Hara, *Chairman*

SOCIETY HEADQUARTERS

Since the Boston Medical Library is now provided with adequate heating facilities, the headquarters of the Society and the office of the *Journal* have resumed their usual time schedule — nine until noon on Saturdays and nine until five on other days of the week.

Incidentally, the Library will be open from nine until nine on Mondays and Thursdays, from nine until five on Tuesdays, Wednesdays and Fridays and from nine until one on Saturdays.

TREASURER'S REPORT

Refund Distributions

The treasurer of the Massachusetts Medical Society makes the following report regarding the refunds to the district societies for 1943:

The Council voted to distribute the sum of $4000 to district societies. The total number of payments of annual dues received by the Treasurer by March 1, to be counted for the refund, was 3466. Therefore the refund to the district societies for each paid fellow is $1.154.

The following table gives the number of payments as of March 1, and the refund to each district as of April 1:

District	Number Reported Paid	Refund
Barnstable	31	$ 35.78
Berkshire	94	108.49
Bristol North	51	58.87
Bristol South	157	181.20
Essex North	137	158.11
Essex South	191	220.43
Franklin	34	39.25
Hampden	214	246.98
Hampshire	47	54.25
Middlesex East	93	107.33
Middlesex North	84	96.95
Middlesex South	698	805.50
Norfolk	600	692.41
Norfolk South	103	118.87
Plymouth	104	120.03
Suffolk	466	537.78
Worcester	289	333.52
Worcester North	73	84.25
Totals	3466	$4000.00

In 1942, for comparison, the total number of payments for the refund was 4023.

Eliot Hubbard, Jr.
Treasurer pro tempore

COMMITTEE ON MATERNAL WELFARE

Breech Delivery: Obstetric considerations

The two previous reports in this column have demonstrated and discussed the neurologic hazards of breech delivery to a baby. In addition, the baby may have a fractured femur, humerus or clavicle; such accidents, however, are minor, because the fractures heal with minimal residual deformity and rarely, if ever, cause disability. The added risk to the mother also deserves consideration.

Third-degree lacerations are much more frequent in breech deliveries, particularly in primiparas. On the other hand, there should be no greater tear of the cervix in breech extraction than in vertex delivery, because the delivery should never be attempted until full dilatation has been accomplished. The same hazards observed in breech delivery are associated with internal podalic version.

In the eighth edition of Williams's textbook on obstetrics, it is estimated that 3.11 per cent of all presentations are breech. According to statistics, the fetal mortality of breech presentation is largely dependent on the presence or absence of complications. Cases complicated by syphilis, toxemia, hydramnios, placenta previa, premature separation of the placenta, and prolapse of the cord showed a fetal mortality of 21.2 per cent in a study made by Goethals at the Boston Lying-in Hospital; however, in full-term uncomplicated pregnancies the mortality was only 6.9 per cent. These figures emphasize the seriousness of breech delivery and the need for giving special attention to all such cases.

Because it is recognized that the vertex presentation carries with it much less risk than the breech presentation, the maneuver of external version, even under an anesthetic, is prescribed in some clinics. This is often simple, particularly in multiparas with relaxed abdominal walls. In primiparas with good-sized babies, however, it is difficult or even impossible. Experience has proved that when it is difficult to turn the baby externally, and anesthesia has been resorted to, too much force may be applied, with the result that interference with the cord, partial separation of the placenta or premature labor occurs. Because of these possibilities, if external version cannot be readily accomplished, the use of an anesthetic had best not be made routine.

The problem of the breech in an elderly primipara, whose baby, because of her age, assumes great importance, has led to the adoption of cesarean section. This certainly is not always justifiable and should depend on the size of the baby and whether or not the membranes have ruptured prematurely. If the baby is large and the pelvis is small, the advisability of cesarean section should be considered. External version should always be attempted, but as already stated, the maneuver should not be carried out as a routine procedure under anesthesia. In young primiparas, premature rupture of the membranes, with the breech remaining high, again raises the question of cesarean section. Experience, x-ray studies of the pelvis and the character of the cervix should determine the need of operation. To say that cesarean section is an unnecessary operation on all breech presentations is just as foolish as to say that all such babies should be delivered by cesarean section. Cesarean section has its place, but each case must be intelligently evaluated.

External version and cesarean section have been employed to lower the mortality and morbidity inherently attendant on breech deliveries. It should be borne in mind that some breech deliveries are easy and that some, even in the hands of the most expert, are extremely difficult. The obstetric details of the case reported in the *Journal* four weeks ago are lacking, and it is consequently unfair to be too critical. However, unless there were unusual complications, it seems as though the injuries to the baby, who weighed 6 pounds, 2 ounces, can be attributed only to inexpert operating. The diagnosis of a breech presentation late in pregnancy should stimulate the question, Will the baby come through this pelvis? If the pelvis is large and the baby seems small, then no x-ray studies should be necessary. In borderline cases x-ray films of the pelvis should be obtained; then, with all the facts at hand, it should be decided whether the baby can or cannot be delivered through the pelvis with safety. If an affirmative decision has been arrived at, the mother should be allowed to go into labor, and to reach full dilatation before any interference is resorted to. The membranes should never be ruptured. There should be no set time at which operative interference is attempted, because frequently such cases need no interference. The mothers have a normal labor, and to say they should be delivered when fully dilated is unintelligent and often leads to unnecessary meddling.

The double footling is relatively simple to deliver. In the frank breech, however, the legs sometimes become flexed on the abdomen and their delivery is difficult. In an attempt to deliver the flexed legs the femur may be fractured.

In breech or footling deliveries, traction on the baby's extremities is used, and all such traction must be gentle. No breech delivery should be accomplished with any specific idea of haste. When the scapulas appear at the vulva, the arms usually extend themselves downward and are born without assistance if the trunk is rotated from one side to the other. This rotation must be gentle

but not forceful. One of the most important considerations in the conduct of breech labor is to have a trained anesthetist who understands intelligent suprapubic pressure.

The delivery of the breech is simplified by a median or mediolateral episiotomy. Its purpose is to avoid tearing of the sphincter and to allow more room in which to work. In former days, breech deliveries, particularly in primiparas, were looked on as extremely hazardous from the standpoint of the mother because of the technic employed in the delivery of the arms. The operator inserted his hand into the vagina when the scapulas appeared; he hooked his fingers in the elbow of the posterior arm, and the forearm was thus extended downward over the abdomen. The baby's body was then rotated so that the anterior arm became posterior, and this arm in turn was extended by the operator's fingers in the elbow. This maneuver frequently resulted in third-degree lacerations. Episiotomy plus rotation of the trunk usually enables the arms to extend themselves downward and thus lessens this hazard materially. When the arms are delivered, the operator puts his finger into the baby's mouth to assist flexion of the head. He must never pull downward on the head, and must never stretch the baby. Unless there is undue disproportion between the baby and the pelvis, suprapubic pressure, aided by the operator's hand in the baby's mouth, almost always promotes delivery of the head through the pelvis. From the time the buttocks appear, the patient should be under full anesthesia so that suprapubic pressure may be accomplished easily. If there be any difficulty with the birth of the head by suprapubic pressure, the Piper forceps should be immediately employed. This instrument should always be boiled with the kit so that it is immediately available.

All statistics of a large number of cases are based on the work of many men. It must, of course, be true that in the hands of trained specialists, breech mortality and morbidity are lower than they are in the practices of those who deliver only an occasional case. However, a careful evaluation of each case before labor starts or at its onset and more gentleness and less haste in the actual delivery will undoubtedly lead to better results.

DEATHS

JEWETT — Howard W. Jewett, M.D., of Lowell, died March 18. He was in his sixty-fourth year.

Dr. Jewett was born in Haverhill. He received his degree from Hahnemann College in Philadelphia in 1905 and interned at the Millard Fillmore Hospital, Buffalo, New York. At the time of his death, he was the senior member of the medical staff at the Lowell General Hospital. He was a member of the Massachusetts Medical Society and the American Medical Association.

His wife and a brother survive him.

MILLER — George F. Miller, M.D., of Belfast, Maine, died March 22. He was in his sixty-eighth year.

Dr. Miller graduated from Tufts College Medical School in 1908. He was a member of the Massachusetts Medical Society and the American Medical Association.

RICE — George B. Rice, M.D., of Boston, died March 28. He was in his eighty-fifth year.

Dr. Rice attended the University of Michigan, where he received his degree. He was a member of the Massachusetts Medical Society, the American Medical Association and the American College of Surgeons. At the time of his death he was consultant in the Nose and Throat Service at the Massachusetts Memorial Hospitals.

His widow and three sons survive him.

RESOLUTION ON DEATH OF PHILIP ROCHE DWYER

The Boston City Hospital mourns the death of Dr. Philip Roche Dwyer, a visiting surgeon on the Ear, Nose and Throat Service. He died in Salem, Massachusetts, on February 28, 1943, at the age of forty-nine.

His parents, the late Philip and Bridget Dwyer, were Beverly residents, and he was born there on February 3, 1894. After attending the local schools he entered Boston College and received his degree in 1916. He graduated from the Harvard Medical School in 1920.

He interned at the Boston City Hospital, where he graduated on November 3, 1921, from the Eye, Ear, Nose and Throat Service. He was immediately appointed a staff member on that service. He was affiliated as a visiting surgeon at the Salem, J. B. Thomas, Peabody and Danvers State hospitals. Dr. Dwyer had practiced his chosen specialty in Salem for the past twenty-three years. He was a member of the Massachusetts Medical Society and the American Medical Association.

He is survived by his widow, Elizabeth M. (Prendergast) Dwyer, a daughter, Elizabeth, and a sister, Miss Mary Dwyer, all of Salem.

Dr. Dwyer was of sterling character, and although enduring many physical handicaps, he was never heard to complain. An able diagnostician, his technical skill was of high order. His engaging smile was one of his outstanding characteristics; his spontaneous wit portrayed his buoyant spirit. He was "our kind" of a man; his life was an inspiration to all.

He was operated on for a ruptured diverticulum at the Salem Hospital. A scheduled blackout took place during his convalescence there. At that time

his many staff friends came to his room to joke and pass the topics of the day. After their departure he asked to be turned on his side — and the end came, painlessly and mercifully, and the valiant spirit of Philip Dwyer passed on. But there was no "blackout" during his life for he denied the sunshine of his smile to none, and we know that God's eternal glow is his forever.

BE IT RESOLVED, that in the death of Philip Roche Dwyer the staff of the Boston City Hospital has lost one of its most learned and beloved members;

BE IT RESOLVED, that the staff of the Boston City Hospital extends its most sincere sympathy to his family; and

BE IT FURTHER RESOLVED, that these recommendations be placed on the records of the Boston City Hospital and that the secretary be directed to send a copy to the family of Dr. Dwyer and a copy to the *New England Journal of Medicine*.

WILLIAM P. BOARDMAN, *Secretary*
Executive Committee, Senior Staff
Boston City Hospital

WAR ACTIVITIES

INDUSTRIAL MEDICINE

PRECAUTIONARY MEASURES FOR WORKERS HANDLING CHLORINATED NAPHTHALENES AND DIPHENYL COMPOUNDS

In connection with the recent outbreaks of dermatitis and systemic injuries resulting from the use of chlorinated naphthalenes and diphenyl compounds in the State of New York, Dr. Leonard Greenburg, director of the Division of Industrial Hygiene, New York State Department of Labor, has suggested that precautionary measures covering the following points be formulated in co-operation with the manufacturers of these compounds for the protection of workers handling these materials:

(1) Recognition of an agreement on toxicity of compound.
(2) Warning to users — agreement to provide all users with notice.
(3) Warning to middle men who sell the material in small lots to users.
(4) Provision by the companies of a statement covering measures for protection.
(5) Agreement by employers to provide pertinent state authority with a list of users and also a list of applications or processes in which the material is used. (This list of users should be kept up to date.)

An evaluation of the potential dangers of these materials is desirable. Hence it has been requested that reports on the incidence of such injuries in different states be sent to Dr. J. G. Townsend, chief of the Division of Industrial Hygiene, National Institute of Health. The following information is to be included in these reports:

(1) The number of cases of dermatitis or systemic poisoning that have occurred in each state.
(2) The duration of the disease (time lost from work).
(3) The industry and specific occupation in which these cases occurred.
(4) The name of the material that was the causative agent.

It is planned to call a meeting of representatives of the five manufacturers of these materials with the Chemical Products Agreements Committee appointed by the Surgeon General.

With this procedure it is hoped that the hazards resulting from the handling of these materials can be adequately controlled. — Reprinted from *Industrial Hygiene* (March, 1943), a bulletin issued monthly by the Division of Industrial Hygiene, United States Public Health Service.

BOOK REVIEWS

Biological Symposia: A series of volumes devoted to current symposia in the field of biology. Edited by Jaques Cattell, Ph.D. Vol. VII. *Visual Mechanisms.* Edited by Heinrich Klüver, Ph.D. 8°, cloth, 322 pp., with 4 tables and 83 illustrations. Lancaster, Pennsylvania: The Jaques Cattell Press, 1942. $3.25.

To celebrate the fiftieth anniversary of the University of Chicago in 1941, a series of symposiums in biologic sciences was arranged dealing with new frontiers in education and in research. Not the least interesting of these was the seventh, held in September, 1941, in which visual mechanisms were discussed by authorities from the points of view of anatomy, biophysics, biochemistry, physiology and psychology. The scope of the presentations is best shown by a list of the titles and authors: "Energy Relations in Vision" by Dr. Selig Hecht; "The Photochemistry of Visual Purple" by Dr. A. C. Krause; "Visual Systems and the Vitamins A" by Dr. George Wald; "Anoxia in Relation to the Visual System" by Dr. E. Gellhorn; "Visual Sensation and Its Dependence on the Neurophysiology of the Optic Pathway" by Dr. S. H. Bartley; "Alpha Waves in Relation to Structures Involved in Vision" by Dr. T. J. Case; "Recent Evidence for Neural Mechanisms in Vision Leading to a General Theory of Sensory Acuity" by Drs. W. H. Marshall and S. A. Talbot; "The Functional Organization of the Occipital Lobe" by Drs. G. von Bonin, H. W. Garol and W. S. McCulloch; "Anatomy of the Retina" by Dr. S. L. Polyak; "The Visual Cells and Their History" by Dr. G. L. Walls; "Functional Significance of the Geniculo-Striate System" by Dr. H. Klüver; "The Problem of Cerebral Organization in Vision" by Dr. K. S. Lashley.

Every researcher who wishes to keep abreast of the advancing frontiers in visual anatomy, physiology and psychology, and every alert practitioner of ophthalmology who wishes to be more discerning in his field would do well to add this important volume to his library.

Physicians' Reference Book of Emergency Medical Service. A compilation. 8°, paper, 268 pp., with 15 illustrations and 8 tables. New York: E. R. Squibb and Sons, 1942. Complimentary.

This compact volume covering the Emergency Medical Service is divided into three sections. The first deals with precautionary measures, the second with hospital services, and the third with the management of casualties. The handbook mainly consists of abstracts from articles writ-

ten by experts on each subject. The material is of recent publication, and many of the articles are from British sources.

In the first section, much sound advice is given concerning the immediate care of the injured, and the extreme importance of getting casualties to the hospital as quickly as possible is stressed. Moreover, fixation of the casualty to the stretcher in such a way that he may be brought to the hospital with as little danger as possible is emphasized. A number of different types of stretchers are depicted, and the correct maneuvers for the immobilization of various types of injury are illustrated.

In the second section, twenty-eight pages are devoted to the modern treatment of burns. The triple-dye, tannic acid and silver nitrate methods, together with saline treatments and different methods of transfusion, are given careful consideration. The general treatment of shock, the theories concerning its causes and the importance of transfusion are taken up in a simple and direct manner. Due attention is given to the use of sulfonamide drugs orally, intravenously and locally. The last part of this section concerns war-gas injuries, a valuable chart describing the different gases and their effects. Rules for decontamination of road surfaces, of buildings and household articles and of vehicles are given. The differential diagnosis of the effects of the various gases is considered, including those affecting the respiratory system, the eyes and the skin.

The book is small but valuable. The descriptions of the different types of emergency medical service are given with remarkable clearness, and the material collected for the volume was judiciously chosen. Every physician should have a copy of this volume.

The Medical Applications of the Short Wave Current. By William Bierman, M.D. With a chapter on physical and technical aspects by Myron M. Schwarzschild, M.A. Second edition. 8°, cloth, 344 pp., with 87 illustrations. Baltimore: The Williams and Wilkins Company, 1942. $5.00.

In the introduction to the present edition the author states that it is estimated that approximately fifty thousand short-wave-current machines are in use in physicians' offices and hospitals in the United States. It requires a good deal of optimism to believe that this great volume of apparatus is employed by people who are well versed in the underlying theory of these currents, the construction of the machines that produce them, their effects on the tissues of the human body, the technics of application and, last but not least, the necessary precautions that must be taken to avoid injuries in the form of deep-seated burns. Such valuable information was contained in the first edition of this text and has been sifted, rearranged and greatly enriched in the second edition.

It is to be regretted that the authors saw fit to ration the chapter on physics, reducing it to about a third of its original size. This section was one of the highlights in the first edition and, in the opinion of the reviewer, should have been revised rather than drastically curtailed. The market is not overburdened with texts whose authors have taken pains to present this aspect of the subject so thoroughly as was done by Schwarzschild in the first edition. On the other hand, the inclusion of a twenty-four-page chapter on fever therapy is a distinct addition. Its importance looms high when one takes into consideration the fact that Dr. Bierman's meritorious contributions to this subject have gained for him wide recognition. Furthermore, the illustrations and bibliography have been improved.

This is a praiseworthy treatise on an extensively practiced but insufficiently illuminated aspect of physical therapy.

The Electrocardiogram and X-Ray Configuration of the Heart. By Arthur M. Master, M.D. Second edition, enlarged and thoroughly revised. 4°, cloth, 404 pp., with 163 illustrations. Philadelphia: Lea and Febiger, 1942. $7.50.

The new edition of Master's excellent book should be required reading for every serious student of electrocardiography. It is not intended to take the place of a textbook of electrocardiography, but it does fill some important gaps that cannot be considered fully in such a book. Interpretation of the electrocardiogram without full knowledge of all the possible extraneous factors that may have influenced it is dangerous and may be misleading. Dr. Master's book shows clearly the many variations incident to age, body build, pulmonary disease, rotation of the heart, acute infections and enlargement of the various chambers of the heart, as well as the more commonly recognized patterns associated with intrinsic myocardial damage. The volume also constitutes a good complete x-ray monograph of the heart. This edition contains considerable new material, including the Diodrast method of contrast visualization of the cardiac chambers.

Dermatologic Therapy in General Practice. By Marion B. Sulzberger, M.D. Second edition. 8°, cloth, 632 pp., with 67 illustrations and 25 tables. Chicago: The Year Book Publishers, Incorporated, 1942. $5.00.

This book is valuable not only as a handbook of therapy for the general practitioner but also as a ready reference for the specialist. The outlines of treatment of the various cutaneous diseases are easily understood and practical. It reveals the pitfalls, and emphasizes not only what to do but what not to do. There are over two hundred useful prescriptions. New methods of therapy, such as the use of the sulfonamide group, the treatment of burns and the technic of massive-dose therapy of syphilis, are wisely discussed. This book is worth buying.

The Surgery of Pancreatic Tumors. By Alexander Brunschwig, M.S., M.D. Illustrated by Gladys McHugh. 4°, cloth, 421 pp., with 123 illustrations and 1 color plate. St. Louis: The C. V. Mosby Company, 1942. $7.50.

This excellent treatise on the surgery of pancreatic tumors is recommended to everyone practicing surgery. Covering as it does the historical aspects, anatomy, embryology, physiology, experimental surgery and various other pancreatic problems, it makes readily available all the necessary material to bring the surgeon up-to-date on this subject. It describes modern technics for the removal of all types of pancreatic tumors and presents discussions of the diagnoses of these conditions. In the reviewer's opinion, there is no comparable work in the literature on this subject. The text is well written in simple language, and is logically arranged. The illustrations are adequate, ample and easily understood.

(Notices on page x)

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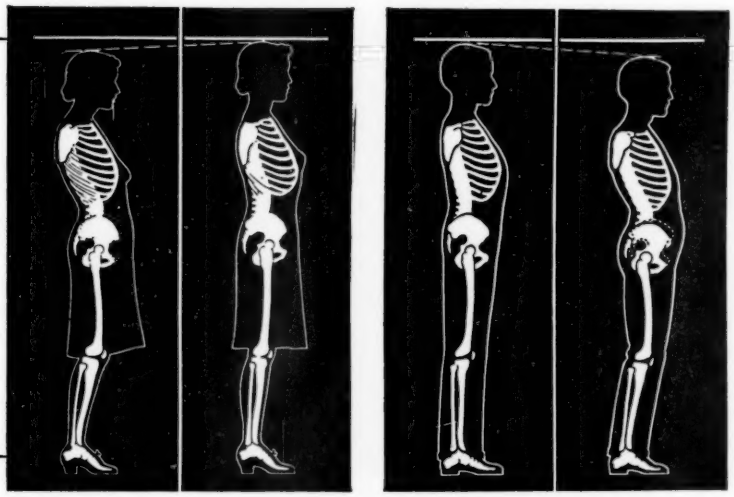

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NOTICES

BOSTON SOCIETY OF BIOLOGISTS

A meeting of the Boston Society of Biologists will be held at the Children's Hospital Amphitheater, 300 Longwood Avenue, on Wednesday, April 14, at 8 p.m.

PROGRAM

The Sites of the Heart Action of a Pure Veratrum Alkaloid, Veratridine. Professor Otto Krayer.

A Contribution to Corneal Physiology. Dr. David G. Cogan and Dr. V. Everett Kinsey.

Acetaldehyde as a Factor in Alcoholism. Dr. Elmer Stotz.

MIDDLESEX SOUTH DISTRICT MEDICAL SOCIETY

The annual meeting of the Middlesex South District Medical Society will be held at the Hotel Continental, Cambridge, on Wednesday, April 14.

PROGRAM

11:30 a.m. Business meeting.
12 m. Annual Oration: Rehabilitation following severe burns. Dr. Bradford Cannon.
12:45 p.m. Luncheon.

CUTTER LECTURE

The Cutter Lecture on Preventive Medicine, given at the Harvard Medical School since 1912, will be held in Amphitheater D on Tuesday, April 27, at 5 p.m. Dr. Lowell T. Coggeshall, of the University of Michigan School of Public Health, Ann Arbor, will speak on the topic, "The Importance of Tropical Diseases in the Current and Post-War Period." The medical profession, medical and public-health students and others interested are cordially invited to attend.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, APRIL 11

MONDAY, APRIL 12

*12:15–1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

TUESDAY, APRIL 13

*9:00–10:00 a.m. Medical clinic. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*12:15–1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

12:30 p.m. Hospital Council of Boston. University Club, 40 Trinity Place, Boston.

8:00 p.m. Spinal Anesthesia for Children. Dr. Sidney C. Wiggin. New England Society of Anesthesiology. Amphitheater of the White Surgical Building, Massachusetts General Hospital.

WEDNESDAY, APRIL 14

*9:00–10:00 a.m. Prevention of Pulmonary Embolism in Thrombosis of the Veins of the Legs. Dr. John Homans. Joseph H. Pratt Diagnostic Hospital.

11:30 a.m. Middlesex South District Medical Society. Hotel Continental, Cambridge.

*12:00 m. Clinicopathological conference. Children's Hospital.

8:00 p.m. Boston Society of Biologists. Children's Hospital Amphitheater, 300 Longwood Avenue, Boston.

THURSDAY, APRIL 15

*9:00–10:00 a.m. Medical clinic. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

FRIDAY, APRIL 16

*9:00–10:00 a.m. Modern Conceptions of Poliomyelitis. Dr. Conrad Wesselhoeft. Joseph H. Pratt Diagnostic Hospital.

SATURDAY, APRIL 17

*10:00–11:30 a.m. Medical staff rounds. Peter Bent Brigham Hospital.

*Open to the medical profession.

April 20. South End Medical Club. Page xi, issue of April 1.
April 27. Cutter Lecture. Page x.
May 19–25. American Board of Obstetrics and Gynecology. Page xii, issue of March 4.
May 24–27. War Conference. Page ix, issue of March 25.
May 25 and 26. Massachusetts Medical Society. Hotel Statler, Boston.
June 4 and 5. American Board of Ophthalmology. Page xii, issue of March 4.

DISTRICT SOCIETIES

BRISTOL SOUTH
May 6. New Bedford.

ESSEX NORTH
May 5.

ESSEX SOUTH
May 5. Salem Country Club.

FRANKLIN
May 11. Annual meeting.
Meetings are held at 11:00 a.m. at the Franklin County Hospital, Greenfield.

HAMPSHIRE
May 5.

MIDDLESEX EAST
May 5. Bear Hill Golf Club, Stoneham, 6:30 p.m.

MIDDLESEX NORTH
April 28.
July 28.

MIDDLESEX SOUTH
April 14. Page x.

PLYMOUTH
April 15. Bridgewater State Farm.
May 20. Lakeville.

WORCESTER
May 12. Annual meeting.

WORCESTER NORTH
April 28.
July 28.

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

What the Citizen Should Know about Wartime Medicine. By Lieutenant Colonel Joseph R. Darnall, Medical Corps, United States Army; and V. I. Cooper. 8°, cloth, 237 pp., with 11 illustrations. New York: W. W. Norton and Company, Incorporated, 1942. $2.50.

This is a popular work for the layman, depicting the place of medicine in the present great conflict. The first part of the work explains the mobilization of medicine for the present war, including the setting-up of methods and procedures for the medical examination of selectees. It describes fully the organization and function of the medical departments of the Army and Navy, both behind the theater of military operations and with the field medical service in the combat zone. The book discusses the new medical problems presented by air fighting, military psychiatry, military sanitation and hygiene, the control of communicable diseases and the immunization of

(Books Received continued on page xiii)

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the armed forces against them, the venereal problem in wartime, and wartime surgery. There is a final chapter on the medical aspects of demobilization. Colonel Darnall is executive officer of Walter Reed Hospital, Army Medical Center, and his collaborator, V. I. Cooper, has been connected with the medical press for many years.

Infant and Child in the Culture of Today. By Arnold Gesell, M.D., director of the Clinic of Child Development, School of Medicine, Yale University; and Frances L. Ilg, M.D., assistant professor of child development, Yale University. In collaboration with Janet Learned, M.A., principal of the Guidance Nursery, and Louise B. Ames, Ph.D., research assistant, the Guidance Nursery. 4°, cloth, 399 pp. New York and London: Harper and Brothers, 1943. $4.00.

This book is the outgrowth of many years of practical experience with normal, near normal and problem children. It has to do with infants and young children who have been studied in the home with parental co-operation, at conferences and in the service division of the Guidance Nursery of the Yale Clinic. The work is concerned primarily with the growth characteristics of the infant and child, and outlines a specific technic for effective guidance and wise psychologic care.

Mental Illness. By Edith M. Stern, with the collaboration of Samuel W. Hamilton, M.D. 8°, cloth, 134 pp. New York: The Commonwealth Fund, 1942. $1.00.

This small manual is written for the thousands of men and women who have mentally ill relatives. The work gives specific directions for each step in handling the patient from the selection of the hospital to the reception of the patient back home after discharge. The reader is taken behind the scenes in mental hospitals and shown how they are set up to give care and treatment. Dr. Samuel W. Hamilton is mental hospital adviser of the United States Public Service and Miss Stern is a professional writer.

A Handbook on Diseases of Children. By Bruce Williamson, M.D. (Edin.), F.R.C.P. (Lond.), physician, Royal Northern Hospital and Prince of Wales Hospital, London, physician (E.M.S.), Wellhouse Hospital, Barnet, consulting physician, Enfield War Memorial Hospital, Brentwood and District Hospital and Pioneer Health Centre, Peckham, and examiner in medicine, General Nursing Council. Third edition. 12°, cloth, 364 pp., with 70 illustrations. Baltimore: The Williams and Wilkins Company, 1942. $4.50.

This third edition of a standard manual has been thoroughly revised and a few illustrations have been added. The latest innovations in treatment, namely, those concerning the use of sulfonamide compounds, have been added to the text.

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1930 Tisdall, F. F., Drake, T. G. H., and Brown, A.: A new cereal mixture containing vitamins and mineral elements, Am. J. Dis. Child. 40:791-799, Oct. 1930.

1931 Tisdall, F. F.: Dietary factors and health, Soc. Tr., Am. J. Dis. Child. 42:1490, Dec. 1931.

1932 Summerfeldt, P.: The value of an increased supply of vitamin B_1 and iron in the diet of children, Am. J. Dis. Child. 43:284-290, Feb. 1932. Morse, J. L.: Fads and fancies in present day pediatrics, Pennsylvania M. J. 35:280-285, Feb. 1932. Henricke, S. G.: The vitamin B complex: Its role in infant feeding in the light of our present knowledge, Northwest Med. 31:165-169, April 1932. Langhorst, H. F.: Vitamins: Their role in the prevention and treatment of disease, M. J. & Rec. 135:326-329, April 6, 1932. Crimm, P. D.: Dietary of Childhood Tuberculosis: Cereal as a source of added mineral and vitamin elements; preliminary report, J. Indiana M. A. 25:205-206, May 1932. Troutt, L.: Quality studies of therapeutic diets: I. The ulcer diet; a committee report, J. Am. Dietet. A. 8:25-32, May 1932. Summerfeldt, P., Tisdall, F. F., and Brown, A.: The curative effects of cereals and biscuits on experimental anaemias, Canad. M.A.J. 26:666-669, June 1932. Sneed, W.: Ununited and delayed union of fractures, Kentucky M. J. 30:363-370, July 1932. Silverman, A. C.: Celiac disease, New York State J. Med. 32:1055-1061, Sept. 15, 1932. von Meysenbug, L.: Infant feeding with especial reference to some of its problems during the first year, Texas State J. Med. 28:543-547, Dec. 1932.

1933 Wampler, F. J., and Forbes, J. C.: Calcium and phosphorus metabolism in a case of celiac disease, South. M. J. 26:555-558, June 1933. Brown, A., and Tisdall, F. F.: The role of minerals and vitamins in growth and resistance to infection, Brit. M. J. 1:55-57, Jan. 14, 1933; Effect of vitamins and the inorganic elements on growth and resistance to disease in children, Ann. Int. Med. 7:342-352, Sept. 1933. Crimm, P. D., Raphael, I. J., and Schnute, L. F.: Diet of tuberculous and non-tuberculous children: Effect of increased supply of vitamin B concentrate and minerals, Am. J. Dis. Child. 46:751-756, Oct. 1933. Smith, A. D.: Consideration of various infants' foods, Pacific Coast J. Homeop. 44:463-465, Sept.-Dec. 1933.

1934 Somers, R., Rotton, G. C., and Rowntree, J. I.: Possibilities of improving dental structures, Soc. Tr., Bull. King Co. M. Soc. 13:6, Jan. 15, 1934. Blatt, M. L.: Development of infants on a diet of a special cereal mixture, Soc. Tr., Am. J. Dis. Child. 47:918, April 1934. Rice, C. V.: Anemia of infancy and early childhood, J. Oklahoma M. A. 27:125-129, April 1934. Hawk, W. A.: A few of the commoner feeding problems in infancy, Univ. Toronto M. J. 11:218-229, May 1934. Ross, J. R., and Burrill, L. M.: The effect of cooking on the digestibility of cereals, J. Pediat. 4:654-659, May 1934. Rice, C. V.: Sauerkraut juice for the acidification of evaporated milk in infant feeding, Arch. Pediat. 51:390-395, June 1934. Eder, H. L.: Iron therapy: A routine procedure during infancy, Arch. Pediat. 51:701-713, Nov. 1934. Lynch, H. D.: Fundamentals of infant feeding, J. Indiana M. A. 27:571-574, Dec. 1934. Chaney, M. S., and Ahlborn, M.: Nutrition, Houghton Mifflin Co., Boston, 1934, p. 323.

1935 Bailey, C. W.: Anemia in infants and young children, J. South Carolina M. A. 31:54-58, March 1935. Kugelmass, I. N.: The recent advances in treatment of nutritional disturbances in infancy and childhood, M. Comment 17:5-13, March 1, 1935. Ross, J. R., and Summerfeldt, P.: Value of increased supply of vitamin B_1 and iron in the diet of children: Paper II, Am. J. Dis. Child. 49:1185-1188, May 1935. von Meysenbug, L.: Breast feeding with especial reference to some of its problems, New Orleans M. & S. J. 87:738-743, May 1935. Tarr, E. M., and McNeile, O.: Relation of vitamin B deficiency to metabolic disturbances during pregnancy and lactation, Am. J. Obst. & Gynec. 29:811-818, June 1935. Blatt, M. L., and Schapiro, I. E.: Influence of a special cereal mixture on infant development, Am. J. Dis. Child. 50:324-336, Aug. 1935. Coward, N. B.: Infant feeding, Nova Scotia M. Bull. 14:525-532, Oct. 1935. Tisdall, F. F.: Inadequacy of present dietary standards, Tr. Sect. Pediat., A.M.A., 1935; Canad. M. A. J. 33:624-628, Dec. 1935. Marriott, W. McK.: Infant Nutrition, second edition, C. V. Mosby Co., St. Louis, 1935, p. 202. Summerfeldt, P.: Iron and its availability in foods, Tr. Sect. Pediat., A.M.A. 1935, pp. 214-220.

1936 Dafoe, A. R.: Further history of the care and feeding of the Dionne quintuplets, Canad. M. A. J. 34:26-32, Jan. 1936. Conn, L. C., Vant, J. R., and Malone, M. M.: Some aspects of maternal nutrition, Surg., Gynec. & Obst. 62:377-383, Feb. 15, 1936. Ross, J. R., and Summerfeldt, P.: Haemoglobin of normal children and certain factors influencing its formation, Canad. M. A. J. 34:155-158, Feb. 1936. Smyth, F. S.: Allergic diseases, J. Pediat. 8:500-515, April 1936. Lemmon, J. R.: Problems of the crying infant, Southwestern Med. 20:248-250, July 1936. Rice, C.V.: The success of treating celiac disease from a standpoint of vitamin deficiency, Arch. Pediat. 53:626-629, Sept. 1936. Smith, C. H.: Management of nutritional anemia in infancy, M. Clin. North America 20:933-950, Nov. 1936. Strong, R. A., editor: Nutritional anemia of infants, Orleans Parish M. Soc. Bull., pp. 6-9, Nov. 9, 1936. Jeans, P. C.: Specific factors in nutrition, Round Table discussion, J. Pediat. 9:693-698, Nov. 1936. Young, J. G.: Meeting the requirements for proper nutrition in infancy, Texas State J. Med. 32:531-533, Dec. 1936.

1937 Stearns, G., and Stinger, D.: Iron retention in infancy, J. Nutrition 13:127-141, Feb. 1937. Strong, R. A.: Nutritional anemia, Mississippi Doctor 15:13-16, Aug. 1937. Smith, C. H.: Prevention and treatment of nutritional anemia in infancy, Preventive Med. 7:115-124, Aug. 1937. Saxl, N. T.: Pediatrics, in Dietetics for the Clinician, edited by M. A. Bridges, third edition, Lea & Febiger, Philadelphia, 1937, pp. 637-639. Boyd, J. D.: Nutrition of the Infant and Child, National Medical Book Co., Inc., New York, 1937, p. 110. Brennemann, J.: Practice of Pediatrics, W. F. Prior Co., Inc.; Hagerstown, Md., 1937, Vol. I, Ch. 25, p. 19. Griffith, J. P. C., and Mitchell, A. G.: The Diseases of Infants and Children, second edition, W. B. Saunders Co., Philadelphia, 1937, pp. 106, 111. Saxl, N. T.: Pediatric Dietetics, Lea & Febiger, Philadelphia, 1937, pp. 131-133.

1938 Hoffman, S. J., Greenhill, J. P., and Lundeen, E. C.: A premature infant, weighing 735 grams and surviving, J.A.M.A. 110:283-285, Jan. 22, 1938. Krasnow, F.: Nutritional influence on teeth, Am. J. Pub. Health 28:325-333, March 1938. Ratner, B.: Round Table discussion on asthma and hay fever in children, J. Pediat. 12:399-413, March 1938. Ratner, B.: Panel discussion on the role of allergy in pediatric practice, J. Pediat. 13:582-604, Oct. 1938. Snelling, C. E.: Nutritional anaemia, Bull. Acad. Med. Toronto 12:710, Oct. 1938. Dauphinee, J. A.: The iron requirement in normal nutrition, Canad. M.A.J. 39:483-486, Nov. 1938. Summerfeldt, P., and Ross, J. R.: Value of an increased supply of vitamin B_1 and iron in the diet of children, Paper III, Am. J. Dis. Child. 56:985-988, Nov. 1938. Tisdall, F. F., and Drake, T. G. H.: The utilization of calcium, J. Nutrition 16:613-620, Dec. 1938. Drake, T. G. H.: Introduction of solid foods into the diets of children, Canad. M. A. J. 39:578-580, Dec. 1938.

1939 Strong, R. A.: The most frequent causes of vomiting in infancy, Texas State J. Med. 34:665-676, Feb. 1939. Ratner, B., and Gruehl, H. L.: Anaphylactogenic properties of certain cereal foods and breadstuffs: Am. J. Dis. Child. 57:739-758, April 1939. Monypenny, D.: Early introduction of solid foods in the infant diet, Soc. Tr., Am. J. Dis. Child. 58:1144-1145, Nov. 1939. Brown, A., and Tisdall, F. F. Common Procedures in the practice of paediatrics, third edition, McClelland & Stewart, Ltd., Toronto, 1939, pp. 77-79.

1940 McDougal, L. L., Jr.: Feeding a normal infant, Mississippi Doctor 17:437-442, Jan. 1940. Monypenny, D.: The early introduction of solid foods in the infant diet, Canad. M. A. J. 42:137-140, Feb. 1940. Robinson, E. C.: A study of two hundred and forty breast-fed and artificially fed infants in the St. Louis area, Am. J. Dis. Child. 58:816-827, April 1940. Ratner, B.: Round Table discussion on food allergy, J. Pediat. 16:653-672, May 1940. Rosenbaum, I., Jr.: The management of the allergic child, Kentucky M. J. 38:199-203, May 1940. Barondes, R. de R.: Report of a case of pellagroid, M. Rec. 151:376-380, June 5, 1940. Brown, A.: The fourth Blackader lecture on a decade of paediatric progress, Canad. M. A. J. 43:305-313, Oct. 1940. Drueck, C. J., Vitamin therapy in colon and rectal disease, Illinois M. J. 78:337-341, Oct. 1940. Swift, F. L.: Infant feeding, Lackawanna Co. M. Soc. Reporter, 33:16-18, Nov. 1940. Bogert, L. J., and Porter, M. T.: Dietetics Simplified, ed. 2, Macmillan Co., New York, 1940, p. 181. Davison, W. C.: The Compleat Pediatrician, third edition, Duke University Press, Durham, N. C., 1940, No. 216. Hawley, E. E., and Maurer-Mast, E. E.: The Fundamentals of Nutrition, C. C. Thomas, Springfield, Ill., 1940, pp. 296, 456. Kugelmass, I. N.: The Newer Nutrition in Pediatric Practice, J. B. Lippincott Co., Philadelphia, 1940, p. 372. Leaman, W. G., Jr.: Management of the Cardiac Patient, J. B. Lippincott Co., Phila., 1940, p. 549. Paterson, D., in Index of Treatment, edited by R. Hutchison, ed. 12, revised, Williams & Wilkins Co., Baltimore, 1940, p. 491. Thomas, G. I.: Dietary of Health and Disease, ed. 3, revised, Lea & Febiger, Phila., 1940, pp. 171.

1941 Gipson, A. C.: The role of allergy in pediatric practice, J. M. A. Alabama 10:272-274, Feb. 1941. Ross, J. R., Monypenny, D., and Jackson, S. H.: II. The effect of cooking on the digestibility of cereals, J. Pediat. 18:395-398, March 1941. Kennedy, A. S., Snider, O., Hazen, J. S., and McLean, C.: The dietary management of intestinal tuberculosis, Canad. M. A. J. 44:380-385, April 1941. McAlpine, K. L.: Management of the nutritional anaemia of infancy, Canad. M. A. J. 44:386-390, April 1941. Patek, A. J., Jr., and Post, J.: Treatment of cirrhosis of the liver by a nutritious diet and supplements rich in vitamin B complex, J. Clin. Investigation 20:481-505, Sept. 1941. Bercovitz, Z., and Johnson, H. J.: Ulcerative Colitis, in Dietetics for the Clinician, by M. A. Bridges, fourth edition, revised, Lea & Febiger, Phila., 1941, p. 295. Bridges, M. A.: Dietetics for the Clinician, fourth edition, revised, Lea & Febiger, Phila., 1941, pp. 727, 751, 809. Griffith, J. P. C., and Mitchell, A. G.: Textbook of Pediatrics, ed. 3, revised, W. B. Saunders Co., Phila., 1941, pp. 87, 91. Rowe, A. H.: Elimination Diets and the Patient's Allergies, Lea & Febiger, Phila., 1941, p. 230. Twiss, J. R.: Gall-bladder Disease, in Dietetics for the Clinician, by M. A. Bridges, fourth edition, revised, Lea & Febiger, Phila., 1941, p. 401.

1942 Gleich, M.: The premature infant, Part II, Arch. Pediat. 59:99-135, Feb. 1942. Part IV, Arch. Pediat. 59:241-263, April 1942. Brown, A., and Robertson, E. C.: Factors to be considered in the construction of the diet of the older child, J. Kansas M. Soc. 43:237-244, June 1942. Porter, L., and Carter, W. E.: Management of the Sick Infant and Child, ed. 6, C. V. Mosby Co., St. Louis, 1942, p. 125. Proudfit, F. T.: Nutrition and Diet Therapy, ed. 8, Macmillan Co., New York, 1942, p. 515. Willard, J. H.: Digestive Diseases in General Practice, F. A. Davis Co., Phila., 1942, p. 147.

SCIENTIFIC BACKGROUND

Mead's Cereal was introduced in 1930, and Pablum in 1932, by Mead Johnson & Company. Since then, the growing literature indicates early recognition and continued acceptance of these products and the important pioneer principles they represent.★

★In response to requests from pediatricians, we are also marketing PABENA—precooked oatmeal, enriched with vitamin and mineral supplements. PABENA closely resembles Pablum in nutritional qualities, and offers the same features of thorough cooking, convenience and economy. 8-ounce cartons. Samples on request.